THE

WASHINGTON

LIFE INSURANCE COMPANY

HISTORICAL, ACTUARIAL AND MEDICAL
STATISTICS

DEC 6 1939

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HISTORICAL.
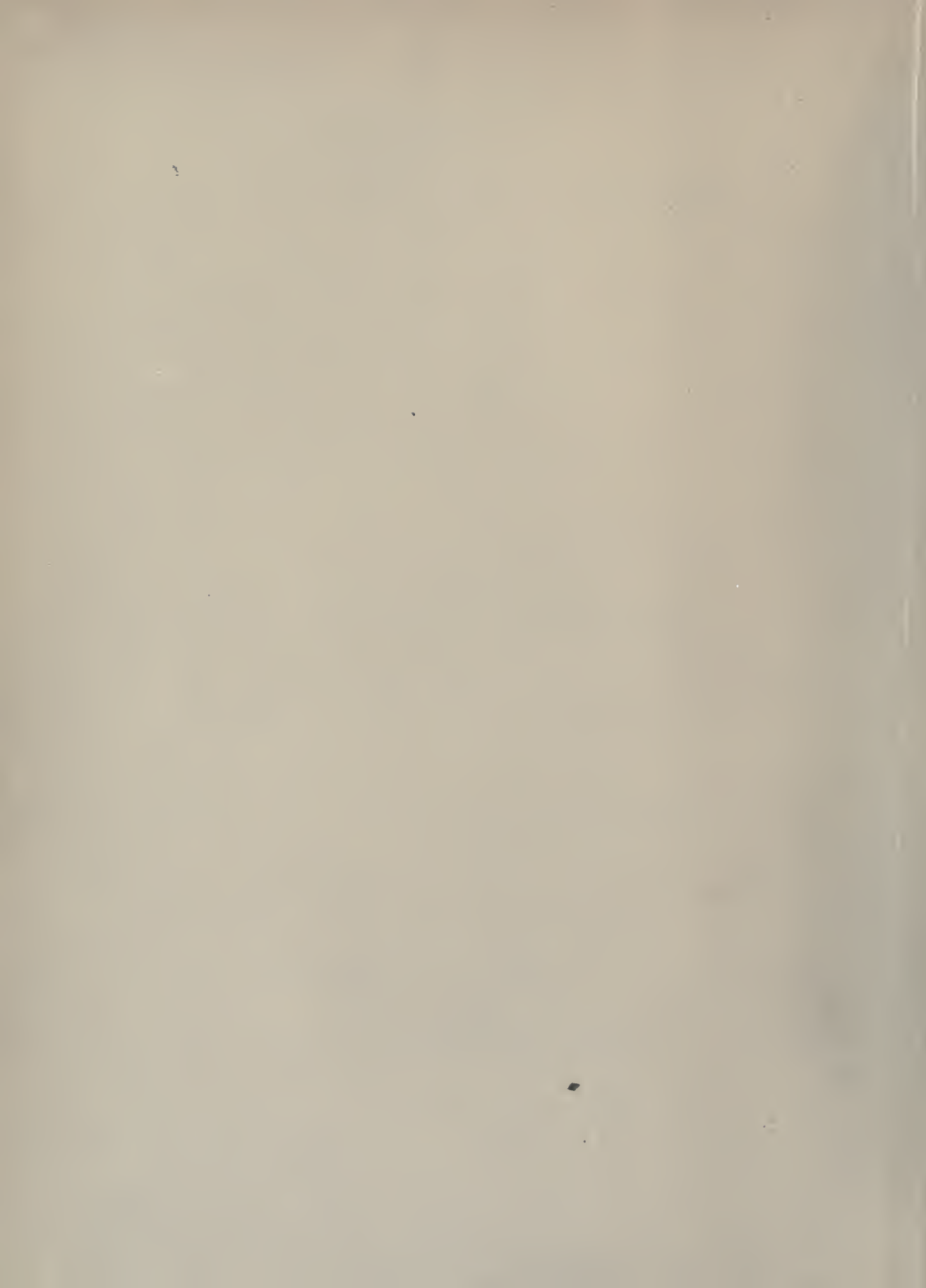
C. J. Brewer Jr. Prest.   W. Hartun V.P & Sec

P.O.Box 774.

OFFICE OF THE
WASHINGTON LIFE INS. CO.
COAL & IRON EXCHANGE.
COR. COURTLANDT & CHURCH STREETS.

Mr W. C. Macdonald   New York, July 3d 1889

Dear Sir:

We hand you herewith a
copy of the "Experience, Actuarial and
Medical, of The Washington Life Insurance
Company" from its organization in 1860,
preceeded by a brief Historical sketch.

The Vital Statistics of the Company
have occupied the attention of our Actuary
and Medical Examiner for several years
past, and we believe that the results of
their labors will be found to be of
great value to all who are interested
in the subject.   Yours Respectfully

with the compliments of

Israel C. Pierson
       Actuary

                                    N. A. Brewer Jr.
                                            Prest.

THE

WASHINGTON LIFE INSURANCE COMPANY

OF NEW YORK.

———◂•▸———

W. A. BREWER, Jr., President.

W. HAXTUN, Vice-President and Secretary.

E. S. FRENCH, Sup't of Agencies.

CYRUS MUNN, Ass't Secretary.

ISRAEL C. PIERSON, Actuary.

B. W. McCREADY, M.D., Consulting Physician.

J. W. BRANNAN, M.D., Medical Examiner.

FOSTER & THOMSON, Attorneys.

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BOARD OF DIRECTORS.

THE WASHINGTON LIFE INSURANCE COMPANY

Was incorporated January, 1860, under an Act of the Legislature of the State of New York, entitled, "An Act to provide for the incorporation of Life and Health Insurance Companies," passed June 24, 1853, and the Act of said Legislature, amendatory thereof, passed July 18, 1853.

Under the Charter, the following gentlemen constituted the first Board of Directors of the Company:

*ROBERT B. MINTURN,
*GEORGE GRISWOLD, JR.,
ROLAND G. MITCHELL,
*FREDERICK G. FOSTER,
*WILLIAM H. NEWMAN,
*FREDERICK TRACY,
*WILLIAM H. ASPINWALL,
*HENRY W. PECK,
GEORGE N. LAWRENCE,
*THOMAS H. FAILE,
*LEWIS F. BATTELLE,
*JAMES PUNNETT,
LEVI P. MORTON,
*EFFINGHAM TOWNSEND,
*CLEAYTON NEWBOLD,
*WILLIAM F. MOTT, JR.,
ABIEL A. LOW,
*MARSHALL LEFFERTS,
*GUSTAV SCHWAB,
†WELLINGTON CLAPP,
MERRITT TRIMBLE,
*LEOPOLD BIERWIRTH,
GEORGE A. ROBBINS,
*ROBERT R. WILLETS,
*CYRUS CURTISS,
*JAMES B. JOHNSTON,

*DAVID WAGSTAFF,
†ABRAHAM BININGER,
DAVID S. EGLESTON,
*HENRY S. FEARING,
*JOHN CASWELL,
†ARTHUR F. WILLMARTH,
THOMAS HOPE,
*ELLWOOD WALTER,
*BENJAMIN W. BONNEY,
*FRANKLIN F. RANDOLPH,
*FREDERICK W. MACY,
*ANDREW V. STOUT,
*HENRY SWIFT,
*DAVID A. WOOD,
*JEREMIAH C. GARTHWAITE,
Newark, N. J.,
*FREDERICK WOOD,
Bridgeport, Conn.,
*FREDERICK CROSWELL,
New Haven, Conn.,
*MATTHEW MITCHELL,
Hudson, N. Y.,
†CHAS. M. JENKINS. Albany, N. Y.,
*BENJAMIN F. RAY, Utica, N. Y.,
*THOMAS B. FITCH, Syracuse, N. Y.,
*GEORGE R. BABCOCK, Buffalo, N. Y.

* Deceased.   † Resigned.

MARSHALL LEFFERTS and DAVID S. EGLESTON failing to qualify as Directors, THOMAS A. PATTESON and JAMES THOMSON were elected at the first meeting of the Board to fill the vacancies.

The first meeting of the Board was held on Saturday, January 21, 1860, when

CYRUS CURTISS was elected President,
CLEAYTON NEWBOLD was elected Vice-President,
WILLIAM A. BREWER, JR., was appointed Secretary and Actuary,
GEORGE T. ELLIOT, JR.,   "   "   Physician,
FOSTER & THOMSON were appointed Attorneys,
GEORGE N. TITUS was appointed Counsel.

The following gentlemen have been elected Directors to fill vacancies as they have occurred from time to time in the Board:

*ROBERT H. BERDELL,	*JOHN H. SHERWOOD,
*JOHN G. VOSE,	WILSON G. HUNT,
GEORGE NEWBOLD,	CHARLES H. LUDINGTON,
†WILLIAM H. COX,	ROBERT BOWNE,
†FRANCIS H. STOTT,	*ISAAC HINCKLEY,
*NEWEL C. HALL,	†CHARLES M. GRIFFITHS,
†STEPHEN T. SOUDER,	*NATHANIEL L. McCREADY,
†HENRY P. ROSS,	*SHERMAN D. PHELPS,
*WILLIAM LINTZ,	*L. LÉONCE COUDERT,
FRANCIS SPEIR,	*PAYNE PETTEBONE,
WILLIAM HAXTUN,	†JOHN H. CASWELL,
BENJAMIN HAXTUN,	EDWIN H. MEAD,
*J. P. GIRAUD FOSTER,	FRANCIS G. ADAMS,
CHARLES P. BRITTON,	FREDERIC R. COUDERT,
BENJAMIN W. McCREADY, M.D.,	DAVID THOMSON.
WILLIAM A. BREWER, JR.,	HAROLD A. SANDERSON.

July 17, 1866, Mr. CYRUS MUNN was appointed Assistant Secretary of the Company.

* Deceased.   † Resigned.

At the Annual Meeting, held April 9, 1867, Mr. NEWBOLD tendered his resignation as Vice-President, on account of long-continued ill-health. The Board refused to accept his resignation, and elected him Vice-President for another year; at the same time electing Mr. MATTHEW MITCHELL to act as Vice-President during the illness of Mr. NEWBOLD.

Mr. NEWBOLD, after many months of suffering, died April 28, 1867.

At a meeting of the Board of Directors of The Washington Life Insurance Company, held July 16, 1867, the death of CLEAYTON NEWBOLD, Vice-President of the Company, having been announced, the following tribute to his memory was unanimously approved and ordered to be entered on the minutes, and a copy thereof presented to his family in testimony of their respect and sympathy:

"The Board of Directors of The Washington Life Insurance Company receive with profound sorrow the intelligence of the death of their Vice-President, CLEAYTON NEWBOLD.

"In recording the sad event, they cannot refrain from expressing their painful sense of its import, as a loss to this Institution and to the community, and as a bereavement to his family, which awakens their heartfelt sympathy.

"Connected with this Company as its Vice-President from its very commencement, and largely instrumental in its organization, Mr. NEWBOLD brought to the discharge of the duties of his office the prerequisites of intelligence, integrity, and fidelity, combined with a purity of life and character which confirmed him in the confidence and esteem of his associates, and an aptitude and capacity the result of an extended commercial experience. He has lived to witness, as

a sequel to his honorable career as a merchant, and as a part of his own appointed round of life duty well fulfilled, the successful establishment of this Institution, the last enterprise with which his name was connected, and has passed away, leaving to his fellow-members of this Board, and to his friends and family, a memory filled with none but honorable and affectionate associations."

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The rapidly increasing private practice of Dr. George T. Elliot, Jr., prevented his giving the time and attention to the Medical Department of the Company that it seemed to demand, and at his request, Dr. BENJAMIN W. McCREADY was appointed Associate Medical Examiner, April 21, 1863. Dr. Elliot died January 29, 1871, and upon his death, Dr. McCready assumed full charge of the Medical Department.

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At the death of Mr. Newbold, Mr. MATTHEW MITCHELL was elected Vice-President, retaining the position until April, 1869, when he declined a re-election; he remained in the Board of Directors, however, until his death, which occurred October 21, 1883. At the next meeting of the Board of Directors, held January 15, 1884, the following remarks of the President, in regard to the death of Mr. Matthew Mitchell, were incorporated in the minutes : "Since we last met as a Board, we have sustained a sad loss in the death of Mr. MATTHEW MITCHELL, who died on the 21st of October last. Mr. Mitchell had been connected with the company from its very inception, having been one of the corporators and first Board of Directors. He had served the Company in various capacities, having filled the office of Secretary during my absence at the war during the summer of 1862, and the office of Vice-President during the latter part of Mr. Newbold's life, being elected Vice-President after

Mr. Newbold's death, but declining a re-election in April, 1869. He served in the Executive and Auditing Committees to the time of his death. His intimate connection with the office gave him a thorough knowledge of the business of Life Insurance, so that we were always glad to avail ourselves of his advice. He greatly endeared himself to all of us by his wisdom and prudence, and by his uniform courtesy, kindness and consideration for others. His face was always welcome among us, and he will be sadly missed by every one connected with the office."

At the Annual Meeting held April 13th, 1869, Mr. WILLIAM A. BREWER, JR., was elected Vice-President and Actuary, and Mr. WILLIAM HAXTUN was appointed Secretary.

In November, 1877, Mr. Cyrus Curtiss was suddenly prostrated by disease, and after a lingering illness of nineteen months, died June 25, 1879.

At a special meeting of the Board held June 30th, 1879, the following tribute to his memory was ordered to be entered in the minutes :

" It having pleased God to remove from us by death our much loved and valued President, it seems appropriate that we make record of some expression of our deep sorrow for our loss, and of our appreciation of the wisdom and devotion to the interests of the Company, from its foundation, on which its prosperity and stability have so eminently depended. In seasons of much discouragement in the early life of the Company, his faith and untiring zeal never for a moment wavered.

" The large circle of his friends will bear testimony to the many virtues with which his long and pure life has been crowned, and will mourn the loss of one so greatly honored and loved.

" To us who have been associated with him in the management of

the Company for a score of years, and have witnessed his ceaseless labors, his departure comes with peculiar force.   While in his character decision was so prominently marked, his kindness and courtesy to all were equally conspicuous ; and even to those engaged in the humblest official duties, his tender regard for their welfare was ever manifest."

June 30, 1879, Mr. WILLIAM A. BREWER, JR., was elected President, and Mr. WILLIAM HAXTUN, Vice-president and Secretary.

Mr. JAMES THOMSON was appointed Counsel of the Company, July 15, 1879.

From the time of the election of Mr. Brewer to the Presidency, the duties of the Actuary had been performed by Mr. ISRAEL C. PIERSON, who received the formal appointment to that position April 1, 1880.

Mr. ELISHA S. FRENCH has been connected with the Agency Department of the Company since 1863, and was made Superintendent of Agencies, April 25, 1868.

In December, 1884, Dr. JOHN W. BRANNAN was employed to collate the mortuary statistics of the Company from its organization, and the results of his labors are given in the Medical Report contained in this volume.

April 19, 1887, Dr. Brannan was appointed Associate Medical Examiner.

August 1, 1888, in view of his years and long service, Dr. McCready was relieved of the arduous duties of Medical Examiner, and was made Consulting Physician ; Dr. Brannan was appointed Medical Examiner of the Company from the same date.

The first office of the Company was located at No. 98 Broadway, in the city of New York.

On the 18th day of June, 1868, the office of the Company was removed to No. 155 Broadway.

On the 20th day of April, 1878, the office of the Company was removed to the "Coal and Iron Exchange Building," No. 21 Cortlandt street.

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The first policy was issued Feb. 2, 1860, on the life of Mr. Frederick S. Winston, President of the Mutual Life Insurance Company, of New York, and remained in force until his death, March 27, 1885.

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The Charter of the Company provides that "the Company, within sixty days next after the expiration of five years from the first day of January, 1861, and within the first sixty days next after the expiration of every subsequent period of five years, shall cause a general statement to be made of the affairs of the Company, which shall exhibit the amount of the then remaining net profits of the Company, after allowing a sufficient amount to re-insure all outstanding risks, and to cover all other obligations. The whole amount of the net profits, so ascertained as above provided, shall be credited to the account of the policy holders, entitled to participate in the profits, which shall be apportioned among them, and paid or applied in such manner and at such times, as the Board of Directors may deem equitable, and from time to time provide."

In accordance with the above provisions, a dividend was declared as of Jan. 1, 1866, upon the "percentage plan," which was then in use by all the life companies. This dividend was a return to policyholders of forty per cent. (40%) of the Life premiums paid prior to the above date.

A demand on the part of policy-holders having arisen for more frequent distribution of surplus, the Board determined, Dec. 17, 1867, under advice of counsel, to adopt the system of annual instead of

quinquennial dividends.   At the same time it adopted the " Contri-
bution Plan" of ascertaining and dividing surplus devised by Mr.
Sheppard Homans, the then Actuary of the Mutual Life Insurance
Company, of New York.

The Charter of the Company also provides that, in case of the
forfeiture of a policy from any cause, " such forfeiture shall not affect
the right of the holder of such policy to any profit that may have been
previously credited to such holder."

Under this Charter provision, the Company will either pay in
cash at the time of the lapsing of a policy the dividends already
credited to it, or will hold the policy good for as long a period as the
dividends standing at the credit of the policy would pay the pre-
mium at the rate named in the policy.

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The following statistical tables show the growth of the Company
from its organization to the present time, it having commenced busi-
ness Feb. 2, 1860, with a paid up cash capital of one hundred and
twenty-five thousand dollars ($125,000).

	POLICIES ISSUED.		Paid to Policy-holders for Claims by Death, Matured Endowments, Dividends, Surrendered Policies, etc.
	Number.	Amount.	
1860	328	$1,093,600	————
1861	225	643,000	$5,000 00
1862	362	860,300	6,986 62
1863	512	1,387,250	10,588 67
1864	919	2,330,300	34,403 36
1865	1,106	3,718,950	45,392 41
1866	1,838	4,410,825	77,585 05
1867	3,055	6,860,460	132,764 84
1868	5,080	10,804,570	137,146 31
1869	6,671	13,251,015	457,780 78
1870	3,435	7,173,575	429,627 94
1871	2,560	5,193,278	431,866 21
1872	2,368	5,607,774	437,920 30
1873	2,273	5,827,269	543,973 20
1874	1,786	3,936,740	562,711 19
1875	1,795	3,712,225	609,079 72
1876	1,433	2,866,235	590,586 14
1877	1,408	2,615,870	862,815 02
1878	1,255	2,270,000	857,605 65
1879	1,432	3,164,290	974,506 75
1880	2,007	4,446,072	931,465 54
1881	2,076	5,072,179	875,103 84
1882	2,825	6,891,831	1,064,263 74
1883	2,644	6,389,470	973,053 87
1884	2,917	6,898,500	1,149,640 80
1885	2,408	5,318,665	993,441 93
1886	3,266	7,695,163	1,111,383 24
1887	3,627	8,288,276	1,088,600 48

	INCOME.		
	Premiums.	Interest, Etc.	Total.
1860	$23,392 13	$4,906 47	$28,298 60
1861	37,850 67	7,693 22	45,543 89
1862	58,152 42	13,341 51	71,493 93
1863	84,885 27	16,570 88	101,456 15
1864	157,750 03	29,968 04	187,718 07
1865	234,773 31	25,873 62	260,646 93
1866	320,584 92	38,943 71	359,528 63
1867	457,132 80	45,690 30	502,823 10
1868	694,865 23	63,350 58	758,215 81
1869	1,127,101 57	81,892 33	1,208,993 90
1870	1,078,243 95	104,945 74	1,183,189 69
1871	992,626 65	138,209 37	1,130,836 02
1872	1,032,413 14	168,228 59	1,200,641 73
1873	1,042,926 75	214,083 28	1,257,010 03
1874	1,007,129 65	239,410 77	1,246,540 42
1875	972,449 80	271,153 60	1,243,603 40
1876	854,811 93	281,027 94	1,135,839 87
1877	983,839 16	296,439 11	1,280,278 27
1878	955,261 14	290,060 49	1,245,321 63
1879	965,382 75	299,535 63	1,264,918 38
1880	1,016,002 66	325,490 17	1,341,492 83
1881	1,119,031 03	318,386 30	1,437,417 33
1882	1,278,000 56	351,969 17	1,629,969 73
1883	1,347,955 29	446,998 07	1,794,953 36
1884	1,434,332 34	341,001 45	1,775,333 79
1885	1,392,483 18	453,974 38	1,846,457 56
1886	1,508,698 70	407,117 81	1,915,816 51
1887	1,654,211 21	420,820 28	2,075,031 49

	DEATHS.		Amount of loss incurred and Paid.	No. of Policies in force.	Amount at risk at the END of each year.
	Lives.	Policies.			
1860	—	—	————	315	$1,040,100
1861	1	1	$5,000	438	1,311,250
1862	2	2	6,000	683	1,910,550
1863	7	7	20,000	1,058	2,945,800
1864	14	14	49,250	1,748	4,661,600
1865	17	20	44,500	2,550	6,920,000
1866	21	23	56,306	3,757	10,017,092
1867	39	42	133,009	5,708	14,099,859
1868	40	43	91,604	8,885	20,650,136
1869	67	70	170,169	12,144	27,385,750
1870	88	93	265,212	11,238	25,951,117
1871	107	115	311,612	10,634	24,888,781
1872	104	110	285,518	10,967	25,950,890
1873	105	116	312,905	11,398	26,812,062
1874	97	103	293,481	11,163	25,048,166
1875	101	113	323,787	11,141	25,429,535
1876	89	98	273,770	10,899	24,346,506
1877	100	113	304,401	10,229	22,327,864
1878	100	111	258,569	9,947	21,215,796
1879	100	120	329,345	10,139	21,447,274
1880	102	110	304,022	11,076	23,451,270
1881	133	146	373,316	11,960	25,928,150
1882	128	148	390,274	13,395	29,374,019
1883	144	158	356,289	14,425	31,994,723
1884	160	173	433,170	15,043	33,334,672
1885	157	177	394,312	15,385	33,956,324
1886	168	202	517,036	16,504	36,574,831
1887	177	199	483,036	17,761	39,506,527

	ASSETS.	LIABILITIES. N. Y. Standard.	SURPLUS. As to Policy-holders.
Dec. 31,			
1860	$141,279 58	$131,173 34	$10,106 24
1861	156,299 85	125,188 33	31,111 52
1862	200,722 55	184,107 08	16,615 47
1863	267,462 79	224,991 98	42,470 81
1864	369,567 51	312,867 50	56,700 01
1865	530,097 36	434,347 50	95,749 86
1866	709,129 99	648,159 44	60,970 55
1867	1,017,643 02	889,185 72	128,457 30
1868	1,503,152 34	1,221,362 38	281,789 96
1869	2,009,717 83	1,878,919 97	130,797 86
1870	2,477,348 41	2,249,189 58	228,158 83
1871	2,869,837 31	2,290,701 40	579,135 91
1872	3,411,203 27	2,984,466 74	426,736 53
1873	3,886,452 90	3,383,301 02	503,151 88
1874	4,379,424 66	3,714,054 61	665,370 05
1875	4,812,709 72	4,068,884 34	743,825 38
1876	5,173,278 83	4,386,685 83	786,593 00
1877	5,353,250 53	4,440,112 20	913,138 33
1878	5,487,809 14	4,556,813 74	930,995 40
1879	5,591,888 99	4,662,575 54	929,313 45
1880	5,815,980 72	4,880,929 66	935,051 06
1881	6,191,887 36	5,316,083 27	875,804 09
1882	6,534,465 15	5,621,631 98	912,833 17
1883	6,978,606 57	6,110,392 67	868,213 90
1884	7,273,649 85	6,474,141 61	799,508 24
1885	7,771,774 86	6,824,552 58	947,222 28
1886	8,231,129 71	7,288,322 97	942,806 74
1887	8,807,478 83	8,304,605 19	*502,873 64

* Act. 4%.—By the old Standard the surplus would have been $1,003,167 64.

ACTUARIAL.

ACTUARIAL.

FOR the work of ascertaining the experience of the Washington Life Insurance Company during a given period, it was necessary, at the outset, to adopt certain principles and methods. These were determined by the questions :

Shall the observations be made by policy or calendar years ?

Shall the amounts of insurance, or the number of lives (or policies) be the basis ?

If lives or policies are to be taken account of at all, shall it be lives, or policies ?

The considerations which follow led to the conclusion that policy years and amounts of policies would be the most reliable and useful data on which to base the operations.

While in medical observations it may be of interest or value to note diseases, and their ratios, which proved fatal in each or any one calendar year, it is of no consequence, mathematically, whether a death occurred in 1884, under a policy issued in 1870, or in 1878 under a policy issued in 1864, assuming that equal care was exercised in the medical examinations at the inception of the risks. Nor does it signify anything that the death occurred in March rather than in November.

The information sought is the amount and duration of insurance, in reference to age at entry and age at death, if it has occurred within the period under observation, and the mortality rate at each age of life and in each policy year of membership.

The use of calendar years necessitates taking December 31st as the point for observation and assuming June 30th as the average date of issue. The data of the first full policy year must be made up by adding to the six months of the first calendar year one half the data of the second calendar year ; the data of the second full policy

year by adding to one half the data of the second calendar year one half those of the third calendar year, and so on.

This result does not seem to be accurate, especially if the new business fluctuates either for the entire year or for the first or second six months of the year.

Moreover, the decimal of a year, for the first and last calendar years of observation, is avoided by the use of policy years.

The anniversaries of policies in a given year (dates to which the annual premiums paid would carry them) are as convenient for an observation point as December 31st of that year. The deaths before the several anniversaries can be easily ascertained. Policies being grouped as to age at issue and years of insurance, the full amount exposed to risk and the actual and probable mortality for each age can be obtained at once, while the persistence of policies, benefit of medical selection and other questions can be readily considered. The age being taken as at the nearest birthday, approximately all policies are issued on the birthday for the age attained. The experience of the Connecticut Mutual Life Insurance Company is made on policy years. Two other companies somewhat older than this company, although their experience has not been published, have pursued the plan of policy years and amounts of insurance. Mr. Woolhouse, the Vice-President of the Institute of Actuaries, in speaking of the work of the " new actuaries " committee says :

" The data thus prepared, on which the calculation of the required table of mortality is to be founded, embody a complete analysis and classification of a mass of observations which extends over a given number of years. To proceed with the calculation of the rates of mortality, the principal requirement will be to ascertain how many lives during that period have entered and passed through each year of age, so as to be enabled to compare the same with the number of deaths that have respectively occurred in the same years. It will also appear that these estimates will not be affected by any *chronological* considerations, since a question as to when any specified life or lives entered the year of age is quite immaterial and forms no part of the inquiry. We only require to know how many lives have

passed through a proposed year of age at all the various times during the period of observation, but without any reference to those times."

What is the financial risk? what is the actual loss? being the practical questions, the *amounts* of policies are used as the basis for observation. These give results most nearly in accord with facts and probability.

Were policies issued for uniform amounts, lives or policies might be the better data, but not only is there a difference in the amounts of policies issued at the same age of entry, there is also a disparity in the amounts of policies issued at the several ages, larger amounts of insurance being taken on single lives at the older ages than at the younger ones. The premium receipts, disbursements, assets, reserve and surplus are in dollars and cents. On this same basis neither *lives* nor *policies*, assumed to be of uniform amounts, will exhibit the true experience of the past, which is to be a guide for the future. Where observations have been made, the percentage of mortality is greater on amounts of policies than on lives or policies, as illustrated by the following table.

PERCENTAGE OF MORTALITY.

Name of table.	By Lives.	By Amounts.
30 Offices	1.03	1.10
Connecticut Mutual	1.12	1.16
Mutual	1.18	1.24
Mutual Benefit	1.12	1.29
Provident Life and Trust	.78	.81
John Hancock	.92	1.10
	By Policies.	
Massachusetts Report, average of all companies	1.29	1.38

The importance of using amounts of policies as a basis of investigation is shown by the tables of the Mutual Benefit Experience. One table of that experience gives the ratio of "Probable

Loss (American Experience) by amounts " as 105 per cent. of the ratio of " probable deaths by lives." Another exhibits, all the way through the table, the mortality rate $\frac{dx}{lx}$ larger on amounts than on lives.

The amounts afford facility for making calculations to decimal places and yet retain the "dollars" figures.

The female risks, comparatively small in number, are included in these observations, but, for obvious reasons, the annuities and the few children's endowments, which the company has issued, are omitted from consideration.

In some cases there are several policies on the same life, but, a new examination having been made for each new policy, it was regarded as a fresh risk.

A paid-up, or a new policy written in lieu of a previous policy was considered as the same risk, continued under another number although for a reduced amount. This plan avoided any disturbance of "selection," to investigate which question accurately required the use of each policy amount and policy year rather than the life and calendar year. It was assumed that policies terminated by death were in force to the end of the policy year in which the death occurred, the premiums having been paid for that period.

Having determined to make observations by policy years instead of calendar years, and by *amounts* rather than *lives*, or *policies*, the work proceeded.

All the data of policies at their issue were written numerically in the Experience Record, from the original applications. After these entries were completed, for policies issued within the period, entries were made, in appropriate columns, for all changes and terminations, in chronological order, from the Blotters, sufficient time having passed to be reasonably sure of securing all the data in these respects.

The Experience Record then contained the requisite history of each policy.

The system of cards now generally adopted and approved was used. On these cards were written, from the original applications also, the data in detail as they stood at the entry of the risks.

From the Experience Record were entered on the cards the dates and modes of termination, reduction, or change, and changes in the amounts, so that every policy was historically represented by a card.

The cards or policies terminated by death were separated, classified by age at issue, and then subdivided by ages at death, by which means the results shown in Table I. were obtained. All the cards representing policies on which there had been any risk, or on which any premium had been paid, were first classified as to age at issue, and then subdivided as to year of issue, in chronological order. The data in detail were then transferred to sheets so arranged that the amounts exposed to risk, for each year of age and for each year of membership, would appear in groups.

If a policy terminated within the year, for any reason (except by death) it was considered as exposed to risk for the entire year, but for the fraction of the amount corresponding with the fraction of the year during which the policy had existed.

Some of the issues of 1860 are still in force. Those amounts appear in every year of membership to the twenty-fifth inclusive. The issues of 1861, if in force, have been exposed for twenty-four years, and so on—there being not more than one year's exposure on the issues of 1884.

The policies and amounts were then aggregated by ages at issue, and for each year of membership. The results are shown in Table I. On the vertical margin is the age at entry. The number on the top margin is the age entered upon and indicates the age which was lived through by policies entered at the age represented by the vertical number.

For the first year of a policy the age on the vertical column and on the top margin are identical. Beginning at the left and youngest age and reading diagonally downward, the amount exposed for each first year of age is ascertained.

The totals of these columns give at once the amount exposed to risk and the amount of deaths in each year of age as shown in Table II. (See Diagram A.) For convenience this table exhibits the prob-

able mortality by the American, Actuaries', Thirty Offices, and H^m. tables. In Table III., some of the irregularities shown by ratios of Table II. disappear in the groupings by 5, 10, 15, etc., years of ages. (See Diagram B.) The groups which include 41–45 and 61–70 show the maximum, and groups which include 21–30 and 71–84 the minimum mortality in comparison with American and Actuaries' tables.

Table IV. exhibits the experience by years of membership, amounts exposed to risk, amounts of death, probable mortality by American and Actuaries' tables, ratio of actual and probable, and ratio of deaths to amount exposed. (See Diagrams C. and D.) These data are also given in groups of 5 years. The benefit of selection is here apparent, although it does not continue beyond the third year, notwithstanding the first quinquennium gives a lower ratio than the subsequent three.

The fifth group may be too small in amount to make a fair showing, but, if it is of any value, it indicates that the early policy-holders of the company were good subjects for life insurance, having great vitality, and are persistent as to living.

The column "Ratio of Deaths to Amount Exposed," illustrates that the "Ratio" may advance and the relative amount of mortality increase with increase of age, while the actual mortality is less than the probable mortality by the tables on which premiums and reserves are based. In the first four quinquennial periods, the ratio of actual to probable mortality increases from 83 to 114 per cent., while the ratio of deaths to amount exposed increases from 90 to 230 per cent. There is a greater disparity in the last quinquennial period. Had assessments been made, on policy-holders, with which to pay death claims as the deaths occurred, the number of assessments would have increased almost threefold in twenty years.

The largest total amounts issued were at ages 30 and 33.

The amount named as exposed to risk, in the first and subsequent years of membership, is not the actual amount issued or entering upon the year, for sometimes the premium was paid only for a fraction of the year entered upon.

In Table V. the benefit of medical selection is shown by a succession of groupings, by quinquennial periods of membership and groups of ages, then by periods and ages of 5 years longer and larger than each preceding one. In almost every group the ratio of actual mortality to probable is the lowest in the first quinquennium of membership. One exception is in the group of ages 11–15, where the amount exposed is too small and the age too young to give a good average. Other exceptions are in groups of ages 61–65, 66–71, 56–71, and 61–71. In these cases the ratio, of actual mortality to probable, decreases with the increase of years of membership. It is in the group 66–71, where occurs the heaviest ratio of actual to probable mortality, as well as the heaviest ratios of deaths to amount exposed.

The actual mortality, although in the early years of membership, as a rule, lower than the probable mortality, yet with much irregularity runs near the probable in other years, sometimes above, sometimes below. It does not seem of value to construct a graduated table of mortality for the early years of membership and one for the later experience in addition to the one which includes the entire experience of the company. From column $\frac{dx}{lx}$ of Table II. the unadjusted mortality experience as shown in Table VI. was readily deduced. Although the earliest age of insurance was 11, and the first death did not occur until age 18, yet in order to make a table symmetrical with others a radix of 100,000 at age 10 was assumed. Inasmuch as they would not enter into any calculations, the numbers dying from age 10 to 17 inclusive were taken from another standard table in pursuance of the example of reliable authorities.

Out of many experimental tables constructed from Table V. by the Makeham and other formulæ for graduation and interpolation, not including ages under 18 or over 81, Table VII. was selected as representing in figures, most faithfully the curve of the mortality experience of this company. (See Diagram E.)

The sum of the products of the amounts exposed to risk, as shown in Table II., by $\frac{dx}{lx}$ of Table VII. is practically the same as the total actual mortality.

Table VIII. gives the ratio of this graduated mortality to the mortality of other tables.   (See Diagram F.)

Table IX. gives the net premiums on several kinds of policies by the American and Actuaries' tables compared with the net premiums on the respective policies if they were based on the graduated mortality experience (Table VII.).

LIFE AND ENDOWMENT POLICIES.—REVERSIONARY DIVIDEND ADDITIONS.

It was not contemplated at the outset to make observations as to the experience of the company on the several kinds of policies.   A section of the company's experience, however, has been considered which develops some interesting and important ratios, as to Life and Endowment policies, and Reversions comparatively.

Table X. exhibits the amount exposed to risk under all classes of Life policies, all classes of Endowment policies, total Life and Endowment policies, Reversionary dividend additions to all classes of Life policies, all classes of Endowment policies, total Reversionary dividend additions and total policies and additions.

It is patent that these additions are the same as single premium paid-up insurance.   The system of keeping the records made it necessary to take this section from the later data.   The popularity of Endowment policies being of more recent date than that of Life policies, the latter are more numerous and more advanced as to age.

This table therefore is not reliable for actual comparison in every respect but it suggests the advisability of closer investigation.

The mortality percentage of amount exposed to risk, for Life policies, is 1.577 and, for Endowment policies, is .734.

While for the reason stated the latter ratio is so small as 47 per cent. of the former, yet the ratio of actual to probable mortality for Endowment policies is almost 71 per cent. of the same ratio for Life policies.

The experience on Reversionary dividend additions is somewhat

curious. Inasmuch as the amounts individually are small, relatively to the policies, and change frequently by being used to pay premiums, there is a manifest difficulty in ascertaining the exact amount exposed to risk at each age and for each year of membership; but the classification having been made with care, the results are sufficiently accurate to exhibit the experience of the company for the period indicated.

The mortality percentage of amount exposed under Life reversion is 2.313 or 147 per cent. of the mortality on Life policies, 317 per cent. of the mortality on Endowment policies and 275 per cent. of the mortality on Endowment reversion.

The mortality percentage on all policies is 1.297, on all Reversionary additions 2.052, the latter being 158 per cent. of the former, whereas the ratio of actual to probable mortality, American experience, is for all policies, .864, for all reversion, .977, the latter being 113 per cent. of the former.

These comparisons, mortality on Life policies with mortality on Endowment policies, and mortality on Reversionary dividend additions with mortality on policies, confirm what has been observed by the Connecticut Mutual and Mr. Meech in the Thirty Offices experience. They excite the question,—Is not the selection made by the applicant an important element in the considerations which are to determine the acceptance or rejection of a risk. Does the applicant *know* himself physically and morally, better than any one else can? If there is even a slight doubt as to his surviving for many years, will he not seek and secure, if possible, the largest amount of insurance for the smallest amount of premium, throwing upon the medical examiner the responsibility of detecting physical defects which may be only the figments of his own imagination?

And the ethics of the case—are they within the province of the medical examiner? Is the applicant to concern himself in that direction?

If the applicant believes that he is as "sound as a dollar," and knows that his habits are "correct and temperate," will he not seek a policy which will give insurance, for a given period, to cover a

business contingency, to protect his wife, to provide for the care and education of his children, and also yield the amount to him if living at the end of the period? Will he not take an endowment policy?

These remarks do not apply of course, to the comparatively few cases in which a company would take a risk on a high rather than on a low premium.

As to Reversionary dividend additions, the details of the work show that on the younger ages the current cash dividend is most frequently used each year, thus canceling the reversion amount. The average amount of reversion per $1,000 of insurance increases with the advance of age. There may be two explanations of this; one, that as the policy-holder progresses in business, being better able, he pays the full premium and lets the dividend remain at his credit; the other, that there comes a time when the policy-holder fears that he cannot pass a medical examination. Anxious to have more insurance, he purposely takes the option of reversionary dividends to augment the amount of his policy. In fact, as a risk, he is depreciating while his insurance is appreciating.

The actual mortality on Life reversion is more than the probable by the American table. The mortality percentage on Endowment reversion is a little more than on policies, while the ratio of actual to probable mortality is smaller on Endowment reversion than on Endowment policies.

Through the courtesy of several life insurance companies, which have the system of reversionary dividends, an opportunity is afforded to make a comparison of Mortality Experience on amounts exposed to risk in that way.

It must be prefaced that the percentages given do not indicate at all the ratio of actual loss to the probable loss by any given table of mortality. Without doubt, for the most part, the ratio would be below par of the American, or Actuaries' table, although the larger amount at risk, and at older ages, would make the mortality percentage on the amount at risk larger—see Tables II., III. and IV., for increase of mortality per cent.—while the ratio of actual to

probable mortality has not increased. The experience is given for the years 1885, '6 & '7, and shows at risk in all the companies a mean annual amount of over one billion dollars in policies and thirty-six million dollars in reversion. The following table exhibits the ratio of amounts terminated by deaths, to amounts exposed.

	Policies.	Reversionary Dividends.	Policies and Reversion.
In all the companies	1.295	2.900	1.350
The lowest ratio is	1.143	2.090	1.156
The highest ratio is	1.445	3.128	1.562
A section of Washington Life Experience	1.297	2.052	1.319

Doubtless an experience similar to that of this company has been observed in the other companies which allow the option of Reversionary dividends,—that the ratio of actual to probable loss is greater on Reversion than on Policies.

TABLE I.

EXPOSURES TO RISK AND DEATHS AT EACH AGE, BY AMOUNTS.

AGE AT EXPOSURE.					
11			**12**		**13**
Age at Entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
11	700					
12			1,500		1,500	
13					5,450	
	$700		$1,500		$6,950	

AGE AT EXPOSURE.					
14			**15**		**16**
12	1,500		1,500		1,500	
13	1,500					
14	6,375		5,000		4,100	
15			28,500		27,500	
16					33,000	
	$9,375		$35,000		$66,100	

AGE AT EXPOSURE.					
17			**18**		**19**
12	1,500		1,500		1,500	
14	2,250		2,250		2,250	
15	25,135		19,085		19,085	
16	26,250		18,250		12,850	
17	71,575		51,000		39,961	1,000
18			149,375	1,000	111,500	1,000
19					224,000	3,000
	$126,710		$241,460	$1,000	$411,146	$5,000

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TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	20 Exposures.	20 Deaths.	21 Exposures.	21 Deaths.	22 Exposures.	22 Deaths.
12	1,500	1,500				
14	2,250		2,250		2,250	
15	16,585		11,085		9,085	
16	11,684		9,050		8,550	
17	29,935		24,195		22,445	1,000
18	77,819	1,000	60,265		39,315	
19	154,750	1,000	117,880		86,729	
20	447,075		310,650	2,000	235,899	
21			869,938	2,000	573,875	
22					1,088,750	5,000
	$741,598	$3,500	$1,405,313	$4,000	$2,066,898	$6,000

AGE AT EXPOSURE.

Age at Entry.	23 Exposures.	23 Deaths.	24 Exposures.	24 Deaths.	25 Exposures.	25 Deaths.
14	1,250		1,250		1,250	
15	9,085		9,085		6,500	
16	7,250		7,250		7,250	
17	20,995		20,750		19,515	
18	28,415		26,915		20,915	
19	65,864	2,000	44,870		34,520	
20	205,215		185,100		158,855	2,000
21	432,606	4,000	316,059	3,000	243,641	
22	708,100	13,000	513,989	1,000	387,348	4,000
23	1,635,020	9,000	1,115,200	6,000	822,408	3,500
24			1,945,600	14,000	1,300,225	5,000
25					2,567,187	10,500
	$3,113,800	$28,000	$4,186,068	$24,000	$5,569,614	$25,000

AGE AT EXPOSURE.

Age at Entry.	26 Exposures.	26 Deaths.	27 Exposures.	27 Deaths.	28 Exposures.	28 Deaths.
14	1,250		1,250		1,150	
15	6,500		6,500		6,500	
16	7,250		7,250		6,850	
17	9,545		8,845		6,845	
18	19,015		17,415		14,615	
19	29,620		26,920		24,330	
20	137,470	2,500	125,575	2,500	114,530	5,000
21	191,976		170,380		160,480	1,000
22	311,553	1,600	253,350	1,000	222,013	3,000
23	605,237	5,500	502,644	9,200	423,406	4,000
24	999,177	5,500	789,309	7,500	633,969	
25	1,747,075	12,500	1,327,945	2,000	1,022,334	7,000
26	2,858,600	16,000	1,977,775	25,750	1,517,186	13,000
27			2,815,102	8,877	1,968,865	6,000
28					3,027,949	13,000
	$6,924,268	$43,600	$8,030,260	$56,827	$9,151,022	$52,000

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	29		30		31	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
14	250		250		150	
15	6,500		1,500		1,500	
16	6,850		6,850		4,000	
17	6,845		6,845		5,845	
18	12,265		12,265		9,115	
19	21,490		20,490		19,990	
20	100,370		90,420		85,520	750
21	147,298	1,000	121,980	7,000	99,587	500
22	203,745		186,501		169,583	
23	359,620	2,000	335,468	750	309,788	2,000
24	548,174	2,000	501,888	7,000	451,915	1,000
25	862,101	5,165	768,550	5,000	677,670	2,500
26	1,132,443	3,160	937,844	8,000	793,172	6,500
27	1,527,604	18,000	1,194,001	18,200	1,025,109	9,000
28	2,195,649	8,000	1,768,620	10,000	1,442,034	9,000
29	3,177,940	11,750	2,344,570	12,000	1,889,708	25,000
30			3,500,831	11,869	2,613,715	19,000
31					3,031.075	5,500
	$10,309,144	$51,075	$11,798,873	$79,819	$12,629,476	$80,750

AGE AT EXPOSURE.

	32		33		34	
15	1,500					
16	2,200		2,200		1,700	
17	5,800		3,000		1,000	
18	9,115		8,980		5,000	
19	19,170		16,740	1,000	14,510	
20	77,770	1,000	71,370		71,320	
21	86,013		72,770		65,470	2,000
22	153,375	3,000	138,590	1,000	116,730	1,000
23	273,985		244,990	4,000	217,872	1,000
24	414,125	1,500	374,890	3,000	322,680	
25	620,585	4,000	566,871	5,000	517,722	12,500
26	733,677	12,000	648,205	1,500	570,107	10,000
27	881,169	11,500	793,902	5,110	726,160	17,000
28	1,176,677	7,000	991,930	10,000	879,029	10,220
29	1,504,575	16,000	1,304,691	11,625	1,109,284	12,000
30	2,071,965	19,000	1,621,317	3,000	1,352,486	5,500
31	2,299,770	7,000	1,801,137	10,500	1,409,884	11,000
32	3,325,936	11,550	2,471,346	26,000	1,967,973	16,750
33			3,351,532	14,500	2,489,382	33,000
34					3,334,601	9,500
	$13,657,407	$93,550	$14,484,461	$96,235	$15,172,910	$141,470

TABLE I.—*Continued.*

| | AGE AT EXPOSURE. | | | | | |
| | 35 | | 36 | | 37 | |
Age at entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
16	700		700		700	
18	1,000		1,000		900	
19	10,110		3,500		3,000	
20	63,670		48,360		33,750	
21	58,320	2,000	52,105		40,483	
22	99,270		92,230		82,595	1,000
23	197,630		179,974	2,045	146,728	
24	296,209	3,000	273,437	2,000	254,244	
25	445,289	2,000	396,698	1,140	368,035	5,500
26	519,423	5,000	467,023		423,167	2,000
27	653,422		586,567		530,221	1,000
28	806,849	7,000	746,316	7,000	685,821	
29	984,085	5,365	889,250	7,000	793,050	7,200
30	1,167,067	8,140	1,050,135	3,590	963,890	8,000
31	1,197,639	8,500	1,011,874	7,000	892,821	2,500
32	1,599,655	11,110	1,350,364	6,150	1,181,747	25,500
33	2,010,000	6,000	1,614,955	18,000	1,366,941	40,360
34	2,573,541	26,500	2,054,209	15,215	1,607,022	8,500
35	3,254,363	28,153	2,400,661	7,500	1,951,470	17,500
36			2,986,785	16,500	2,200,860	6,000
37					2,936,337	9,500
	$15,938,242	$112,768	$16,206,143	$93,140	$16,463,782	$134,560

| | AGE AT EXPOSURE. | | | | | |
| | 38 | | 39 | | 40 | |
Age at entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
16	700					
20	26,660		17,500		4,000	
21	30,615		22,500		14,500	
22	64,790		55,855	115	44,500	
23	134,659	.	115,095		93,675	
24	240,730	1,000	202,666	9,000	153,245	
25	320,560		277,755	2,000	245,335	
26	373,263	2,205	332,238	2,865	292,525	11,000
27	481,680	1,000	413,843	2,000	369,320	6,500
28	631,629	2,000	590,148	11,000	525,698	2,000
29	750,443	2,000	673,169	5,605	610,952	2,770
30	883,834	8,000	796,638	4,060	703,925	13,300
31	813,390	7,500	739,528	1,000	652,645	7,340
32	1,010,232	11,000	915,394	7,000	835,191	16,000
33	1,149,180	12,590	1,026,116	2,160	946,547	4,900
34	1,397,506	15,000	1,147,660	21,500	1,009,758	9,500
35	1,563,185	13,000	1,335,525	21,000	1,185,578	15,000
36	1,716,395	7,000	1,358,010	14,500	1,107,440	13,500
37	2,271,087	13,750	1,763,617	19,995	1,397,394	14,250
38	2,925,636	4,800	2,200,986	22,000	1,801,244	21,000
39			2,963,150	4,500	2,263,605	15,000
40					2,790,502	11,500
	$16,786,174	$100,845	$16,947,393	$150,300	$17,047,579	$163,560

TABLE I.—*Continued.*

| | AGE AT EXPOSURE. | | | | | |
| | 41 | | 42 | | 43 | |
Age at Entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
20	3,000		2,000		2,000	
21	5,500		4,500		4,500	
22	35,500		25,500	.	18,000	
23	71,120		33,300		21,800	
24	101,735		76,235		67,900	5,000
25	185,515	2,000	137,615		100,985	
26	234,937	1,000	187,775	1,000	125,875	
27	316,590	4,500	278,276	3,000	208,815	
28	444,261	3,899	398,681	4,000	359,325	1,000
29	530,934	2,000	475,265	6,000	416,765	7,000
30	641,045	1,000	587,400	1,615	522,837	8,000
31	571,880	2,000	529,705	3,500	485,893	3,500
32	751,625	9,500	659,121	4,035	633,820	7,500
33	878,024	25,500	761,936	9,500	692,889	14,140
34	928,216	3,800	830,144	10,100	734,133	18,520
35	1,073,039	16,000	992,648	2,125	928,147	26,000
36	967,131	11,785	827,047	13,500	732,048	4,750
37	1,159,819	14,000	1,004,770	14,000	878,102	8,000
38	1,417,697	7,500	1,203,156	1,967	1,041,532	1,000
39	1,816,232	23,000	1,453,637	4,000	1,243,893	19,000
40	2,047,437	11,500	1,705,999	31,000	1,365,386	23,500
41	2,433,976	32,000	1,829,326	29,000	1,527,651	25,500
42			2,436,685	12,885	1,887,125	21,500
43					1,976,763	17,000
	$16,615,213	$170,984	$16,440,721	$151,227	$15,976,184	$210,910

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	44		45		46	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
20	2,000	2,000				
21	3,000					
22	7,500					
23	11,800		6,000		6,000	
24	46,500		33,500		20,500	
25	73,100	10,000	25,895		13,500	
26	93,920	1,000	74,475	2,250	34,600	
27	173,770	220	117,820		84,550	
28	270,470	7,255	188,560	5,000	105,790	1,000
29	366,390	1,000	254,435	1,000	173,815	10,000
30	457,587	7,000	392,215	23,095	307,780	8,000
31	430,385	2,500	396,220	11,000	328,996	5,190
32	564,005	2,035	518,105	1,000	465,070	4,080
33	627,624	10,200	551,616	7,900	502,241	6,000
34	621,457	8,000	556,032	15,500	465,833	9,085
35	829,664	1,000	734,676	19,910	675,707	6,000
36	688,095	3,090	634,461	16,770	567,178	13,500
37	795,102	9,500	706,707	6,425	642,377	12,000
38	920,360	2,000	845,197	10,000	771,830	10,609
39	1,029,428	4,000	908,082	8,000	811,520	33,600
40	1,151,631	12,090	1,012,955	5,000	899,626	10,609
41	1,277,930	9,000	1,066,093	5,500	927,311	8,000
42	1,528,497	7,500	1,230,626	17,000	1,020,726	8,900
43	1,496,213	27,000	1,193,257	8,000	956,845	10,722
44	1,918,375	8,000	1,536,860	9,000	1,295,159	5,000
45			1,867,712	4,000	1,535,237	4,700
46					1,697,540	9,000
	$15,384,803	$134,390	$14,851,499	$176,350	$14,309,731	$175,995

TABLE I.—*Continued.*

| Age at Entry. | AGE AT EXPOSURE. | | | | | |
| | 47 | | 48 | | 49 | |
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
23	6,000					
24	14,500		13,000			
25	12,500		10,000		3,000	
26	21,600		11,600		8,825	
27	59,350	2,000	34,575		25,575	1,000
28	85,290		72,190		45,690	
29	127,405	3,000	93,215	10,000	41,000	
30	207,055	1,000	138,075		92,900	2,000
31	246,410	3,000	180,645	12,000	136,090	
32	396,385	5,000	276,715		166,095	3,000
33	454,008	6,000	395,121	3,000	303,781	11,500
34	418,115	5,400	380,705	4,000	320,770	3,000
35	586,126	3,000	511,235	12,000	455,944	
36	518,453	14,670	466,016	1,000	407,178	4,000
37	562,215	4,000	526,095	9,000	474,920	2,000
38	719,085	5,500	651,665	8,000	571,928	1,000
39	710,785	3,095	657,747	10,700	581,051	10,000
40	812,144	17,000	749,486	6,500	659,836	5,500
41	843,049	7,000	771,059	13,200	700,856	7,000
42	863,948	10,000	778,610	16,400	714,590	7,400
43	767,941	3,000	625,654		562,966	21,000
44	1,018,317	22,000	870,798	4,500	752,350	
45	1,296,672	7,500	1,065,562	41,500	848,775	12,000
46	1,345,650	4,500	1,083,478	13,000	893,372	5,500
47	1,604,980	21,000	1,262,525	21,500	1,034,938	30,000
48			1,266,056	2,000	974,097	12,000
49					1,171,300	7,000
	$13,697,983	$147,665	$12,891,827	$188,300	$11,947,827	$144,900

TABLE I.—*Continued.*

	AGE AT EXPOSURE.					
	50		51		52	
Age at Entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
26	5,000					
27	16,575		16,575			
28	37,000		28,500		5,500	
29	28,500		21,000		8,500	
30	59,400		45,500		29,500	
31	78,260		38,310		27,169	2,500
32	109,635		91,315		70,490	1,500
33	224,466		154,660		114,315	11,750
34	227,170	1,000	163,895		111,605	3,500
35	390,093	6,000	308,738		235,518	3,533
36	370,602	7,815	317,468	2,535	217,983	1,750
37	412,239	165	366,565	100	317,270	7,455
38	518,275	350	457,351	1,000	421,880	9,268
39	530,795	6,500	497,113	2,200	442,200	5,000
40	580,836	5,000	523,271	1,250	500,661	5,000
41	624,286	9,500	565,491	1,000	514,391	2,000
42	621,520	8,500	544,747	3,000	473,035	1,000
43	476,287	6,000	428,176		397,886	4,500
44	670,955	14,600	637,950	7,500	545,907	7,500
45	740,487	4,000	662,467	1,000	617,070	1,200
46	760,860	9,000	646,533	15,345	582,382	18,500
47	776,438	8,000	658,605	10,000	572,413	1,100
48	808,142	3,500	668,317	1,500	578,628	11,500
49	1,001,700	12,500	836,960	22,000	696,913	8,000
50	1,021,198	9,000	786,823	5,500	617,491	4,500
51			930,112	6,788	771,341	20,000
52					875,750	2,000
	$11,090,719	$111,430	$10,396,442	$80,718	$9,745,798	$133,056

TABLE I.—*Continued.*

Age at Entry.	AGE AT EXPOSURE.					
	53		54		55	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
29	2,500					
30	20,500		14,500			
31	11,500		4,000			
32	55,900		37,750		24,000	.
33	40,845	1,000	26,500		15,000	
34	95,800		63,980		30,000	
35	154,700	2,000	112,120		81,500	1,500
36	161,190		121,180	2,000	88,125	
37	241,815	2,175	190,345	7,000	132,105	2,000
38	360,483	10,375	287,610	5,500	214,485	
39	401,315	12,000	323,280	3,030	238,585	7,080
40	429,823	1,000	371,623	6,090	311,391	6,000
41	484,421	10,000	445,850	7,080	419,640	15,535
42	403,070	11,565	366,524	1,100	307,052	17,190
43	368,280	7,000	348,356	6,250	317,766	2,780
44	495,735	22,900	430,775		402,395	105
45	575,043		529,856	16,740	475,248	15,000
46	513,632	4,000	467,907	1,000	412,974	5,685
47	527,547		463,020	6,115	404,621	4,530
48	476,545	16,000	413,876	2,000	393,014	6,000
49	592,226	2,500	489,595	1,195	438,004	3,195
50	514,758	20,600	416,931	16,500	369,341	10,000
51	678,205	12,500	567,440	17,000	439,495	2,500
52	715,125	7,500	604,846	12,000	515,604	26,000
53	723,325		566,450	1,000	467,921	5,000
54			625,414	43,500	499,064	1,000
55					479,430	1,000
	$9,044,283	$143,115	$8,289,728	$155,100	$7,476,760	$132,100

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	56		57		58	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
32	11,000					
33	12,000	2,500	9,500			
34	13,000		7,000		6,000	
35	59,000		28,000		19,000	
36	70,450		54,000	6,000	40,000	
37	96,945	1,000	70,140	3,000	51,880	
38	176,285	6,960	125,800	2,500	69,930	
39	170,220	9,600	126,865	2,000	71,465	2,000
40	201,323	2,950	164,448	11,000	125,963	1,145
41	360,310	3,000	269,503	4,300	176,180	5,260
42	263,305	2,000	234,345	6,000	186,080	1,000
43	295,624		283,786	2,000	250,186	1,000
44	376,790	8,000	348,190	3,870	284,530	1,850
45	427,780	5,000	367,202	10,000	312,789	11,000
46	365,455	4,000	329,290	5,575	299,301	7,500
47	353,479	13,000	302,975	640	271,655	7,000
48	345,595	3,500	298,730	3,000	244,504	3,000
49	404,725	7,000	381,945	20,000	339,020	17,000
50	325,959	155	303,916	6,000	273,416	8,000
51	382,799	15,500	329,895	3,900	281,814	6,000
52	416,667		383,955	1,000	343,795	21,000
53	377,335	5,000	310,835	10,500	282,720	13,000
54	404,734	7,500	346,039	3,000	292,150	5,000
55	406,680	8,030	330,445	1,000	295,245	8,800
56	558,825	3,500	445,325	10,500	378,010	2,000
57			317,099		260,224	5,000
58					444,750	12,000
	$6,876,285	$108,195	$6,169,228	$115,785	$5,600,607	$138,555

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	59		60		61	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
35	13,475					
36	25,000		23,000			
37	23,880		16,880		2,000	
38	45,215	2,000	31,385		22,885	
39	35,150		14,850	1,000	11,350	
40	88,743	5,000	57,900	2,000	38,500	1,000
41	112,385	245	67,970	2,000	65,070	2,000
42	137,285		118,400		73,635	1,500
43	185,666	1,000	135,510	17,500	75,010	1,000
44	243,445	7,500	203,250	6,000	148,485	
45	248,133	4,145	180,970	2,200	129,480	11,000
46	252,815	1,000	226,855	10,500	195,456	15,175
47	220,855	1,000	192,945	8,645	159,055	
48	219,690	8,000	199,400	2,000	178,995	4,600
49	290,630	23,000	231,195	7,600	191,970	7,375
50	245,851	13,000	215,965	15,200	189,586	5,600
51	244,860	7,940	227,400	2,500	217,320	5,000
52	287,850	11,500	259,845	3,410	239,205	5,000
53	235,630	5,000	199,855		190,930	
54	222,280	1,500	189,659	3,000	167,524	1,600
55	245,405		223,005	11,500	184,405	13,000
56	282,270	2,500	261,580	6,000	222,985	10,000
57	204,524	1,000	172,514	8,000	139,904	2,000
58	380,250		350,737	12,000	275,715	1,000
59	364,250	10,500	315,750	9,000	242,668	
60			302,475	2,000	212,100	6,000
61					251,500	20,000
	$4,855,537	$105,830	$4,419,295	$132,055	$3,825,733	$112,850

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	62		63		64	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
38	22,885					
39	7,850		7,850			
40	32,500		18,000		11,000	
41	46,070		30,570		21,000	5,000
42	41,135	1,000	34,635		30,500	2,000
43	61,510	5,000	45,510		32,510	
44	107,325		67,660		48,000	5,000
45	84,693	5,490	79,975	1,000	58,200	1,000
46	141,921	8,000	97,700	5,500	67,975	6,500
47	141,505	10,000	97,302	7,055	62,900	
48	161,925	7,200	132,400	1,000	100,905	1,000
49	164,200	20,000	116,455	2,000	97,395	3,000
50	163,993	11,245	139,171	1,000	138,216	5,175
51	177,927	4,500	144,850	1,530	137,555	27,500
52	202,560	8,500	169,120	11,000	151,436	1,500
53	180,158	2,000	175,140		156,965	2,000
54	161,334		154,389	14,000	124,764	6,255
55	165,005	5,000	109,805		101,405	
56	189,435	3,200	179,630	7,500	158,385	3,000
57	117,194	10,000	95,799		88,444	3,000
58	224,225	15,000	197,640	6,680	161,555	2,500
59	229,829	23,000	171,444	30,000	125,950	6,000
60	185,100	2,500	167,575		163,375	10,600
61	197,500		145,250	2,000	121,793	13,000
62	137,250	3,000	99,500		86,850	5,500
63			105,596	2,500	86,346	3,000
64					100,000	2,000
	$3,345,029	$144,635	$2,782,966	$92,765	$2,433,424	$114,530

TABLE I.—*Continued.*

	AGE AT EXPOSURE.					
	65		**66**		**67**	
Age at Entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
41	15,000					
42	14,500		4,500			
43	21,510	1,000	15,510	2,510	8,000	
44	29,000		25,000	4,000	15,000	
45	47,000	5,000	31,500		15,500	
46	47,840		37,840		32,120	
47	51,750	3,000	47,750	1,000	29,950	
48	62,505	1,000	50,980		30,480	
49	61,120		51,590	2,000	48,815	8,000
50	101,116	5,000	75,161		43,501	1,000
51	85,545		74,515	3,000	48,810	10,000
52	131,500	5,000	114,103	18,735	72,820	2,480
53	132,165	4,000	125,245		108,845	5,000
54	106,259	9,000	77,509	5,000	57,309	1,000
55	97,347	1,000	79,560		72,060	6,110
56	153,770	5,000	142,020	3,810	138,210	15,150
57	80,614	5,000	72,499	1,095	66,684	600
58	135,015	1,000	126,015	14,000	87,645	
59	110,075	6,500	94,450	3,000	82,403	10,000
60	117,075	10,000	109,575	5,275	88,300	2,000
61	94,180		82,015	12,675	68,040	
62	65,200		57,208		51,595	
63	74,181		66,181	1,250	47,431	
64	80,875	2,500	66,400		51,000	1,000
65	79,000		64,250		54,100	200
66			27,750	6,500	20,000	
67					40,500	10,000
	$1,994,142	$64,000	$1,719,126	$83,850	$1,379,118	$72,540

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at entry.	68		69		70	
	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
44	15,000					
45	15,500		5,000			
46	24,540		3,000			
47	21,800		14,800		10,000	7,000
48	24,480	2,500	19,880	880	10,500	
49	35,395	10,000	23,500		19,500	
50	28,601	2,000	22,421		19,165	
51	35,290	11,500	20,800		20,800	8,000
52	43,905	75	25,680	1,000	14,000	2,000
53	69,645	12,065	52,215		37,075	1,000
54	54,309	7,500	43,109		35,274	
55	63,075	3,000	53,750	20,000	21,550	1,000
56	112,060	7,975	83,375		81,695	5,000
57	63,229	230	60,999	5,000	47,699	2,000
58	86,470	28,955	50,515		50,515	
59	68,595	7,000	63,980	6,000	55,980	3,155
60	65,710		63,710		60,210	
61	66,165	1,490	63,500		63,500	1,500
62	48,845	3,500	40,345	7,000	30,345	5,000
63	47,431	5,400	40,016	2,500	37,516	
64	50,000	1,000	45,800		40,250	
65	48,400	10,000	33,400	2,000	18,400	
66	20,000	1,000	4,000		4,000	
67	12,000		12,000	5,000	7,000	
68	35,625	1,000	14,000		14,000	
69			5,000			
70					11,500	500
	$1,156,070	$116,190	$864,795	$49,380	$710,474	$36,155

TABLE I.—*Continued.*

AGE AT EXPOSURE.

	71		72		73	
Age at Entry.	Exposures.	Deaths.	Exposures.	Deaths.	Exposures.	Deaths.
47	3,000					
48	3,000					
49	13,500	2,000	6,500		2,000	
50	13,165		11,165	410	9,755	
51	12,000		10,000	2,000	8,000	
52	6,000		1,000	1,000		
53	17,075		16,000	3,000	13,000	
54	18,274		15,774		13,774	
55	18,050	300	8,000		7,000	
56	41,695	555	40,044	2,000	35,500	17,000
57	42,619		41,619	5,000	19,264	
58	47,515		36,955		33,340	290
59	51,325	9,500	37,849	2,000	31,825	1,000
60	58,618		57,500		53,445	4,000
61	60,000	1,335	58,665	1,650	51,715	
62	25,345		23,245	2,145	21,100	
63	33,016	1,500	30,016	1,000	28,516	
64	37,500	5,000	30,000		30,000	
65	16,400		16,400		12,640	
66	4,000		4,000	1,000	3,000	3,000
67	6,000		6,000		2,000	
68	3,000	1,000	1,125		1,125	
70	11,000		10,075		10,075	
71	7,500		7,500		5,000	
	$549,597	$21,190	$469,432	$21,205	$392,074	$25,290

AGE AT EXPOSURE.

	74		75		76	
50	7,000					
51	8,000		2,000			
53	6,500		6,000		3,000	
54	13,774		9,774	3,000	6,774	
55	5,000		5,000		2,000	
56	11,750		4,000		4,000	
57	18,264		16,964		8,964	
58	32,845		11,500	1,000	6,000	
59	25,825		24,740	4,000	1,240	
60	43,945		28,945		17,445	
61	18,680		17,680	8,000	9,680	75
62	21,100		7,100		3,100	
63	22,516	485	22,031	85	20,946	
64	25,000		24,320	1,000	23,320	
65	12,290		9,570	3,890	5,000	2,000
67	2,000		2,000		2,000	
68	1,125		1,125		1,125	
70	10,075		7,575		5,075	
71	5,000	5,000				
	$290,689	$5,485	$200,324	$20,975	$119,669	$2,075

TABLE I.—*Continued.*

AGE AT EXPOSURE.

Age at Entry.	77 Exposures.	Deaths.	78 Exposures.	Deaths.	79 Exposures.	Deaths.
53	3,000					
54	6,774		2,000			
55	2,000		2,000		2,000	
56	4,000		4,000		3,000	
57	8,964	1,200	6,764		5,764	
58	1,000		1,000			
59	240					
60	16,445	5,000	5,945		4,000	2,500
61	7,000	7,000				
62	3,100		450			
63	20,946	946	20,000		10,000	
64	13,320	320	13,000	10,000	3,000	
65	3,000		3,000		3,000	
67	2,000	1,000	1,000	1,000		
68	1,125		1,125	125	1,000	
70	5,075		5,075		5,075	5,000
	$97,989	$15,466	$65,359	$11,125	$36,839	$7,500

AGE AT EXPOSURE.

	80		81		82	
57	4,764					
60	1,500		1,500		1,500	
64	2,000	2,000				
65	3,000		3,000		3,000	
68	1,000		1,000		1,000	
70	75		75		75	
	$12,339	$2,000	$5,575		$5,575	

AGE AT EXPOSURE.

	83		84	
68	1,000		1,000	
70	19			
	$1,019		$1,000	

TABLE

EXPOSURES AND

Age at Exposure.	Amount Exposed.	Actual Mortality.	Probable Mortality.		
			American.	Actuaries.	30 Offices.
11	700		5	5	5
12	1,500		11	10	10
13	6,950		53	48	45
14	9,375		71	65	62
15	35,000		267	243	231
16	66,100		506	463	437
17	126,710		974	895	842
18	241,460	1,000	1,866	1,723	1,614
19	411,146	5,000	3,193	2,963	2,762
20	741,598	3,500	5,788	5,407	5,015
21	1,405,313	4,000	11,039	10,367	9,567
22	2,066,898	6,000	16,341	15,427	14,171
23	3,113,800	28,000	24,780	23,553	21,519
24	4,186,068	24,000	33,535	32,090	29,189
25	5,569,614	25,000	44,919	43,276	39,166
26	6,924,268	43,600	56,294	54,612	49,266
27	8,030,260	56,827	65,824	64,290	57,738
28	9,151,022	52,000	75,624	74,480	66,574
29	10,309,144	51,075	86,030	85,308	76,133
30	11,798,873	79,819	99,429	99,406	88,315
31	12,629,476	80,750	107,477	108,326	96,009
32	13,657,407	93,550	117,549	119,451	105,531
33	14,484,461	96,235	126,276	129,177	114,007
34	15,172,910	141,470	133,992	137,988	121,793
35	15,938,242	112,768	142,584	148,024	130,885
36	16,206,143	93,140	147,298	153,705	135,970
37	16,463,782	134,560	152,027	159,475	141,440
38	16,786,174	100,845	157,924	166,274	148,155
39	16,947,393	150,300	162,458	171,684	153,831
40	17,047,579	163,560	166,964	176,637	159,565
41	16,615,213	170,984	166,285	176,321	160,287
42	16,440,721	151,227	168,550	179,105	164,374
43	15,976,184	210,910	168,022	179,748	165,369
44	15,384,803	134,390	166,602	179,956	165,556
45	14,851,499	176,350	165,787	181,367	166,381
46	14,309,731	175,995	165,449	183,723	167,252
47	13,697,983	147,665	164,376	185,142	167,485
48	12,891,827	188,300	161,264	183,837	165,196
49	11,947,827	144,900	156,588	179,946	160,806
50	11,090,719	111,430	152,841	176,775	157,211
51	10,396,442	80,718	151,177	175,679	155,479
52	9,745,798	133,056	149,978	174,908	154,120

DEATHS BY AGES.

PROBABLE MORTALITY.		RATIO OF ACTUAL TO PROBABLE MORTALITY.					MORTALITY RATE.	Age at Exposure.
Hm.	Hm(5).	American.	Actuaries.	30 Offices.	Hm.	Hm(5).	Deaths / Amts. Exposed.	
3	2							11
5	5							12
20	20							13
26	28							14
100	114							15
215	249							16
492	558							17
1,157	1,316	.536	.580	.620	.760	.864	.004 141	18
2,362	2,763	1.566	1.688	1.810	1.810	2.117	.012 161	19
4,694	6,175	.605	.647	.698	.567	.746	.004 720	20
9,451	13,571	.362	.386	.418	.295	.423	.002 846	21
14,146	21,250	.367	.389	.423	.282	.424	.002 903	22
21,062	33,346	1.130	1.189	1.301	.840	1.329	.008 992	23
27,791	45,314	.716	.748	.822	.530	.864	.005 733	24
36,927	58,514	.557	.578	.638	.427	.677	.004 489	25
46,289	69,686	.775	.798	.885	.626	.942	.006 297	26
55,441	79,845	.863	.884	.984	.712	1.025	.007 077	27
65,631	88,802	.688	.698	.781	.586	.792	.005 682	28
76,628	97,504	.594	.599	.671	.524	.667	.004 954	29
91,123	108,585	.803	.803	.904	.735	.876	.006 765	30
99,988	115,838	.751	.745	.841	.697	.808	.006 394	31
110,693	126,427	.796	.783	.886	.740	.845	.006 850	32
120,004	133,619	.762	.745	.844	.720	.802	.006 644	33
129,030	143,096	1.056	1.025	1.162	.989	1.096	.009 324	34
139,842	159,414	.791	.762	.862	.707	.806	.007 075	35
147,622	167,685	.632	.606	.685	.555	.631	.005 747	36
155,813	176,179	.885	.844	.951	.764	.864	.008 173	37
164,169	185,739	.639	.606	.681	.543	.614	.006 008	38
170,864	189,624	.925	.875	.977	.793	.880	.008 869	39
175,692	192,910	.980	.926	1.025	.848	.931	.009 594	40
174,244	188,034	1.028	.970	1.067	.909	.981	.010 291	41
176,475	190,318	.897	.844	.920	.795	.857	.009 198	42
177,767	189,222	1.255	1.173	1.275	1.115	1.186	.013 202	43
177,787	188,495	.807	.747	.812	.713	.756	.008 735	44
181,069	192,223	1.064	.972	1.060	.917	.974	.011 874	45
185,168	195,457	1.064	.958	1.052	.900	.950	.012 299	46
187,690	197,278	.898	.798	.882	.749	.787	.010 780	47
186,158	197,438	1.168	1.024	1.140	.954	1.012	.014 606	48
181,846	194,355	.925	.805	.901	.746	.797	.012 128	49
176,897	189,829	.729	.630	.709	.587	.630	.010 047	50
173,309	187,188	.534	.460	.519	.431	.466	.007 764	51
171,029	183,085	.887	.761	.863	.727	.778	.013 653	52

TABLE

Age at Exposure.	Amount Exposed.	Actual Mortality.	Probable Mortality.		
			American.	Actuaries.	30 Offices.
53	9,044,283	143,115	147,720	172,682	151,510
54	8,289,728	155,100	144,208	168,389	147,383
55	7,476,760	132,100	138,851	161,977	141,535
56	6,876,285	108,195	136,735	159,021	138,708
57	6,169,228	115,785	131,620	152,250	133,009
58	5,600,607	138,555	128,456	147,778	129,150
59	4,855,537	105,830	120,029	137,153	119,966
60	4,419,295	132,055	117,964	134,064	117,231
61	3,825,733	112,850	110,487	124,765	109,144
62	3,345,029	144,635	104,673	117,477	102,692
63	2,782,966	92,765	94,462	105,307	92,138
64	2,433,424	114,530	89,728	99,347	86,971
65	1,994,142	64,000	80,023	87,906	77,054
66	1,719,126	83,850	75,138	81,854	71,841
67	1,379,118	72,540	65,711	70,989	62,449
68	1,156,070	116,190	60,118	64,312	56,697
69	864,795	49,380	49,087	51,963	46,043
70	710,474	36,155	44,044	46,133	41,050
71	549,597	21,190	37,188	38,559	34,501
72	469,432	21,205	34,613	35,585	32,023
73	392,074	25,290	31,436	32,105	29,072
74	290,689	5,485	25,298	25,717	23,461
75	200,324	20,975	18,905	19,143	17,587
76	119,669	2,075	12,243	12,347	11,429
77	97,989	15,466	10,883	10,923	10,190
78	65,359	11,125	7,897	7,872	7,397
79	36,839	7,500	4,853	4,791	4,538
80	12,339	2,000	1,783	1,732	1,654
81	5,575		884	844	813
82	5,575		972	910	885
83	1,019		195	179	176
84	1,000		211	190	188
Totals	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848

PROBABLE MORTALITY.		RATIO OF ACTUAL TO PROBABLE MORTALITY.					MORTALITY RATE.	Age at Exposure.
Hm.	Hm(5).	American.	Actuaries.	30 Offices.	Hm.	Hm(5).	Deaths / Amts. Exposed.	
168,224	180,080	.969	.829	.945	.795	.851	.015 824	53
163,589	173,595	1.076	.921	1.052	.893	.948	.018 710	54
157,259	165,886	.951	.816	.933	.796	.840	.017 668	55
154,393	161,634	.791	.680	.780	.669	.701	.015 735	56
148,000	154,693	.880	.760	.871	.748	.782	.018 768	57
143,521	148,847	1.080	.938	1.073	.931	.965	.024 739	58
133,717	137,703	.882	.772	.882	.769	.791	.021 796	59
131,156	135,398	1.119	.985	1.126	.975	1.007	.029 881	60
122,569	125,928	1.021	.905	1.034	.921	.896	.029 498	61
115,858	119,026	1.380	1.231	1.408	1.248	1.215	.043 239	62
104,333	107,144	.982	.881	1.007	.889	.866	.033 333	63
98,335	101,498	1.276	1.153	1.317	1.165	1.128	.047 065	64
86,608	88,967	.800	.728	.831	.739	.719	.032 094	65
80,058	82,236	1.116	1.024	1.167	1.047	1.020	.048 775	66
68,803	70,276	1.104	1.022	1.162	1.054	1.032	.052 599	67
61,542	62,947	1.932	1.807	2.049	1.888	1.846	.100 504	68
49,587	50,260	1.006	.950	1.072	.996	.982	.057 100	69
44,186	44,643	.821	.784	.881	.818	.810	.050 889	70
37,400	37,680	.570	.550	.614	.567	.562	.038 556	71
35,179	35,466	.613	.596	.662	.603	.598	.045 172	72
32,487	32,730	.804	.790	.870	.778	.773	.064 503	73
26,509	26,810	.217	.213	.234	.207	.205	.018 868	74
19,704	19,931	1.110	1.096	1.193	1.065	1.052	.104 705	75
12,729	12,942	.169	.168	.182	.163	.160	.017 339	76
11,238	11,316	1.421	1.416	1.518	1.376	1.367	.157 834	77
8,053	8,146	1.409	1.413	1.504	1.381	1.366	.170 214	78
4,902	4,970	1.545	1.565	1.653	1.528	1.509	.203 589	79
1,785	1,799	1.122	1.155	1.209	1.120	1.112	.162 088	80
881	885							81
955	961							82
189	189							83
199	199							84
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.1184	Totals

TABLE

EXPOSURES AND DEATHS

Ages at Exposure.	Amount Exposed.	Actual Mortality.	Probable Mortality.		
			American.	Actuaries.	30 Offices.
11–15	53,525		407	371	353
16–20	1,587,014	9,500	12,327	11,451	10,670
21–25	16,341,693	87,000	130,614	124,713	113,612
26–30	46,213,567	283,321	383,201	378,096	338,026
31–35	71,882,496	524,773	627,878	642,966	568,225
36–40	83,451,071	642,405	786,671	827,775	738,961
41–45	79,268,420	843,861	835,246	896,497	821,967
46–50	63,938,087	768,290	800,518	909,423	817,950
51–55	44,953,011	644,089	731,934	853,635	750,027
56–60	27,920,952	600,420	634,804	730,266	638,064
61–65	14,381,294	528,780	479,373	534,802	467,999
66–70	5,829,583	358,115	294,098	315,251	278,080
71–75	1,902,116	94,145	147,440	151,109	136,644
76–84	345,364	38,166	39,921	39,788	37,270
	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848
11–20	1,640,539	9,500	12,734	11,822	11,023
21–30	62,555,260	370,321	513,815	502,809	451,638
31–40	155,333,567	1,167,178	1,414,549	1,470,741	1,307,186
41–50	143,206,507	1,612,151	1,635,764	1,805,920	1,639,917
51–60	72,873,963	1,244,509	1,366,738	1,583,901	1,388,091
61–70	20,210,877	886,895	773,471	850,053	746,079
71–84	2,247,480	132,311	187,361	190,897	173,914
	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848

(5 Years. — applies to first group; 10 Years. — applies to second group)

III.

BY GROUPS OF AGES.

PROBABLE MORTALITY.		RATIO OF ACTUAL TO PROBABLE MORTALITY.					MORTALITY RATE.	Ages at Exposure.
Hm.	Hm(5).	American.	Actuaries.	30 Offices.	Hm.	Hm(5).	Deaths / Amts. Exposed.	
154	169							11–15
8,920	11,061	.771	.830	.890	1.065	.859	.00599	16–20
109,377	171,995	.666	.698	.766	.795	.506	.00532	21–25
335,112	444,422	.739	.749	.838	.845	.638	.00613	26–30
599,557	678,394	.836	.817	.924	.875	.774	.00730	31–35
814,160	912,137	.817	.776	.869	.789	.704	.00770	36–40
887,342	948,292	1.010	.941	1.027	.951	.890	.01065	41–45
917,759	974,357	.960	.845	.939	.837	.789	.01202	46–50
833,410	889,834	.880	.755	.859	.773	.724	.01433	51–55
710,787	738,275	.946	.822	.941	.845	.813	.02150	56–60
527,703	542,563	1.103	.989	1.130	1.002	.975	.03677	61–65
304,176	310,362	1.218	1.136	1.288	1.177	1.154	.06143	66–70
151,279	152,617	.639	.623	.689	.622	.617	.04950	71–75
40,931	41,407	.956	.959	1.024	.932	.922	.11050	76–84
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.01184	5 Years.
9,074	11,230	.746	.804	.862	1.047	.846	.00579	11–20
444,489	616,417	.721	.737	.820	.833	.601	.00592	21–30
1,413,717	1,590,531	.825	.794	.893	.826	.732	.00756	31–40
1,805,101	1,922,649	.986	.893	.983	.893	.839	.01126	41–50
1,544,197	1,628,109	.911	.786	.897	.806	.764	.01708	51–60
831,879	852,925	1.147	1.043	1.189	1.066	1.040	.04388	61–70
192,210	194,024	.706	.693	.761	.688	.682	.05887	71–84
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.01184	10 Years.

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TABLE

Ages at Exposure.	Amount Exposed.	Actual Mortality.	Probable Mortality.		
			American.	Actuaries.	30 Offices.
15 Years. 11–25	17,982,232	96,500	143,348	136,535	124,635
26–40	201,547,134	1,450,499	1,797,750	1,848,837	1,645,212
41–55	188,159,518	2,256,240	2,367,698	2,659,555	2,389,944
56–70	48,131,829	1,487,315	1,408,275	1,580,319	1,384,143
71–84	2,247,480	132,311	187,361	190,897	173,914
	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848
20 Years. 11–30	64,195,799	379,821	526,549	514,631	462,661
31–50	298,540,074	2,779,329	3,050,313	3,276,661	2,947,103
51–70	93,084,840	2,131,404	2,140,209	2,433,954	2,134,170
71–84	2,247,480	132,311	187,361	190,897	173,914
	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848
25 Years. 11–35	136,078,295	904,594	1,154,427	1,157,597	1,030,886
36–60	299,531,541	3,499,065	3,789,173	4,217,596	3,766,969
61–84	22,458,357	1,019,206	960,832	1,040,950	919,993
	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848
30 Years. 11–40	219,529,366	1,546,999	1,941,098	1,985,372	1,769,847
41–84	238,538,827	3,875,866	3,963,334	4,430,771	3,948,001
	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$5,717,848

Probable Mortality.		Ratio of Actual to Probable Mortality.					Mortality Rate.	Ages at Exposure.	
H^m.	H^m(5).	American.	Actuaries.	30 Offices.	H^m.	H^m(5).	Deaths / Amts. Exposed.		
118,451	183,225	.673	.707	.774	.815	.527	.00536	11–25	
1,748,829	2,034,953	.809	.785	.882	.829	.713	.00719	26–40	15 Years.
2,638,511	2,812,483	.953	.848	.944	.855	.802	.01200	41–55	
1,542,666	1,591,200	1.056	.941	1.075	.964	.935	.03090	56–70	
192,210	194,024	.706	.693	.761	.688	.682	.05887	71–84	
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.01184		
453,563	627,647	.721	.738	.821	.837	.605	.00592	11–30	
3,218,818	3,513,180	.911	.848	.943	.863	.791	.00931	31–50	20 Years.
2,376,076	2,481,034	.996	.876	.999	.897	.859	.02290	51–70	
192,210	194,024	.706	.693	.761	.688	.682	.05887	71–84	
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.01184		
1,053,120	1,306,041	.784	.781	.877	.859	.693	.00665	11–35	
4,163,458	4,462,895	.923	.830	.929	.840	.784	.01168	36–60	25 Years.
1,024,089	1,046,949	1.061	.979	1.108	.995	.974	.04538	61–84	
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.01184		
1,867,280	2,218,178	.797	.779	.874	.828	.697	.00705	11–40	
4,373,387	4,597,707	.978	.875	.982	.886	.843	.01625	41–84	30 Years.
$6,240,667	$6,815,885	.918	.845	.948	.869	.796	.01184		

TABLE

EXPOSURES AND DEATHS

Years of Membership.	Amount Exposed.	Actual Mortality.	Probable Mortality.		
			American.	Actuaries.	H^m(5).
1	79,171,620	470,672	807,485	851,642	937,794
2	59,274,210	500,230	627,905	668,368	727,973
3	47,537,319	466,660	523,502	561,389	605,974
4	37,929,604	471,092	434,838	469,446	502,955
5	31,763,704	378,657	377,002	409,017	435,707
1–5	255,676,457	2,287,311	2,770,732	2,959,862	3,210,403
6	27,147,624	349,410	334,613	364,727	386,530
7	24,042,256	290,779	307,691	336,748	355,395
8	21,807,974	271,430	290,643	319,135	335,646
9	19,711,902	266,399	273,160	300,803	315,498
10	17,770,497	282,310	259,039	285,796	298,940
6–10	110,480,253	1,460,328	1,465,146	1,607,209	1,692,009
11	15,763,610	258,445	242,550	268,144	279,606
12	14,243,391	209,645	228,877	253,307	263,616
13	12,722,550	157,090	215,860	239,039	248,209
14	11,199,674	188,579	196,913	218,483	226,411
15	9,913,580	226,439	183,551	203,607	210,515
11–15	63,842,805	1,040,198	1,067,751	1,182,580	1,228,357
16	8,338,441	169,020	158,344	175,922	182,786
17	6,215,383	118,940	124,845	138,563	141,915
18	4,413,594	136,718	90,602	100,895	103,833
19	3,136,562	48,350	67,483	75,281	77,293
20	2,229,117	85,500	50,731	56,495	57,829
16–20	24,333,097	558,528	492,005	547,156	563,656
21	1,437,018	28,700	37,192	41,146	41,969
22	984,597	18,380	27,945	30,744	31,251
23	654,363	10,410	21,015	22,888	23,251
24	416,318	17,010	14,461	15,642	15,922
25	243,285	2,000	8,185	8,916	9,067
21–25	3,735,581	76,500	108,798	119,336	121,460
Totals	$458,068,193	$5,422,865	$5,904,432	$6,416,143	$6,815,885

IV.

BY YEARS OF MEMBERSHIP.

Ratio of Actual to Probable Mortality.			Ratio of Probable to Actual Mortality.			Mortality Rate.	Years of Membership.
American.	Actuaries.	Hᵐ(5).	American.	Actuaries.	Hᵐ(5).	Deaths / Amts. Exposed.	
.583	.553	.502	1.715	1.808	1.992	.00594	1
.797	.749	.687	1.255	1.335	1.456	.00844	2
.891	.831	.770	1.122	1.203	1.299	.00982	3
1.083	1.004	.937	.923	.996	1.067	.01242	4
1.004	.926	.869	.996	1.080	1.151	.01192	5
.826	.773	.712	1.211	1.294	1.404	.00895	1–5
1.044	.958	.904	.958	1.044	1.106	.01287	6
.945	.864	.818	1.058	1.157	1.222	.01209	7
.934	.851	.809	1.071	1.175	1.236	.01245	8
.975	.886	.844	1.026	1.129	1.185	.01351	9
1.090	.988	.944	.917	1.012	1.059	.01589	10
.997	.909	.863	1.003	1.100	1.159	.01322	6–10
1.066	.964	.924	.938	1.037	1.082	.01640	11
.916	.828	.795	1.092	1.208	1.258	.01472	12
.728	.657	.633	1.374	1.522	1.580	.01235	13
.958	.863	.833	1.044	1.159	1.200	.01684	14
1.234	1.112	1.076	.810	.899	.929	.02284	15
.974	.880	.847	1.027	1.136	1.181	.01629	11–15
1.067	.961	.925	.937	1.041	1.081	.02027	16
.953	.858	.838	1.049	1.166	1.193	.01914	17
1.509	1.355	1.317	.663	.738	.759	.03098	18
.716	.642	.626	1.397	1.558	1.597	.01541	19
1.685	1.513	1.478	.593	.661	.677	.03836	20
1.135	1.021	.991	.881	.979	1.009	.02295	16–20
.772	.698	.684	1.295	1.433	1.462	.01997	21
.658	.598	.588	1.520	1.672	1.701	.01867	22
.495	.455	.448	2.020	2.198	2.232	.01591	23
1.176	1.087	1.068	.850	.920	.936	.04086	24
.244	.224	.221	4.098	4.464	4.525	.00822	25
.703	.641	.630	1.422	1.560	1.587	.02048	21–25
.918	.845	.796	1.089	1.183	1.256	.01184	Totals

TABLE V.

EXPOSURES AND DEATHS BY GROUPS OF YEARS OF MEMBERSHIP AND YEARS OF AGE AT ISSUE.

11-15

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	154,430		1,180	1,086		
10	225,605	1,500	1,742	1,615	.861	.929
15	264,255	1,500	2,057	1,925	.729	.779
20	269,405	1,500	2,101	1,969	.714	.762
25	269,405	1,500	2,101	1,969	.714	.762
6–10	71,175	1,500	562	529	2.669	2.836
15	109,825	1,500	877	839	1.710	1.788
20	114,975	1,500	921	883	1.629	1.699
25	114,975	1,500	921	883	1.629	1.699
11–15	38,650		315	310		
20	43,800		359	354		
25	43,800		359	354		
16–20	5,150		44	44		
25	5,150		44	44		
21–25						

16-20

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	2,790,136	12,000	21,869	20,492	.549	.586
10	3,832,471	25,000	30,348	28,722	.824	.870
15	4,454,401	27,750	35,658	34,082	.778	.814
20	4,712,941	27,750	38,003	36,522	.731	.760
25	4,728,041	29,750	38,155	36,682	.780	.811
6–10	1,042,335	13,000	8,479	8,230	1.533	1.580
15	1,664,265	15,750	13,789	13,590	1.142	1.159
20	1,922,805	15,750	16,134	16,030	.976	.983
25	1,937,905	17,750	16,286	16,190	1.090	1.096
11–15	621,930	2,750	5,310	5,360	.518	.513
20	880,470	2,750	7,655	7,800	.359	.353
25	895,570	4,750	7,807	7,960	.608	.597
16–20	258,540		2,345	2,440		
25	273,640	2,000	2,497	2,600	.801	.769
21–25	15,100	2,000	152	160	13.158	12.500

TABLE V.—*Continued.*

21-25

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.			
			American.	Actuaries.	American.	Actuaries.
1– 5	23,321,290	135,965	188,287	181,473	.722	.749
10	32,293,253	201,215	264,357	257,841	.761	.780
15	37,458,439	234,400	311,047	306,382	.754	.765
20	39,694,062	261,515	333,063	329,701	.785	.793
25	40,007,057	261,515	336,551	333,520	.777	.784
6–10	8,971,963	65,250	76,070	76,368	.858	.854
15	14,137,149	98,435	122,760	124,909	.802	.788
20	16,372,772	125,550	144,776	148,228	.867	.847
25	16,685,767	125,550	148,264	152,047	.847	.826
11–15	5,165,186	33,185	46,690	48,541	.711	.684
20	7,400,809	60,300	68,706	71,860	.878	.839
25	7,713,804	60,300	72,194	75,679	.835	.797
16–20	2,235,123	27,115	22,016	23,319	1.232	1.163
25	2,548,618	27,115	25,504	27,138	1.063	.999
21–25	312,995		3,488	3,819		

26-30

Grouped Years of Membership.	Amount Exposed.	ACTUAL.	American.	Actuaries.	American.	Actuaries.
1– 5	47,947,256	307,731	403,212	402,290	.763	.765
10	68,350,681	475,916	586,354	592,130	.812	.804
15	80,560,847	586,175	706,322	719,164	.830	.815
20	85,303,780	667,995	758,933	776,672	.880	.860
25	85,997,835	670,995	768,310	787,457	.873	.852
6–10	20,403,425	168,185	183,142	189,840	918	.886
15	32,613,591	278,444	303,110	316,874	.919	.879
20	37,356,524	360,264	355,721	374,382	1.013	.962
25	38,050,579	363,264	365,098	385,167	.995	.943
11–15	12,210,166	110,259	119,968	127,034	.919	.868
20	16,953,099	192,079	172,579	184,542	1.113	1.041
25	17,647,154	195,079	181,956	195,327	1.072	.999
16–20	4,742,933	81,820	52,611	57,508	1.555	1.423
25	5,436,988	84,820	61,988	68,293	1.368	1.242
21–25	694,055	3,000	9,377	10,785	.320	.278

TABLE V.—*Continued.*

31-35

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	52,759,672	387,788	470,664	486,631	.824	.797
10	75,984,909	660,323	698,332	727,634	.946	.907
15	89,473,321	828,608	849,390	893,323	.976	.928
20	94,796,619	902,081	921,498	976,244	.979	.924
25	95,501,538	911,081	934,170	990,993	.975	.919
6–10	23,225,237	272,535	227,668	241,003	1.197	1.131
15	36,713,649	440,820	378,726	406,692	1.164	1.084
20	42,036,947	514,293	450,834	489,613	1.141	1.050
25	42,741,866	523,293	463,506	504,362	1.129	1.038
11–15	13,488,412	168,285	151,058	165,689	1.114	1.016
20	18,811,710	241,758	223,166	248,610	1.083	.972
25	19,516,629	250,758	235,838	263,359	1.063	.952
16–20	5,323,298	73,473	72,108	82,921	1.019	.886
25	6,028,217	81,473	84,780	97,770	.961	.833
21–25	704,919	9,000	12,672	14,749	.710	.610

36-40

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	47,247,935	341,352	459,827	486,217	.742	.702
10	67,673,388	574,285	688,491	736,918	.834	.779
15	79,824,636	704,193	856,359	930,428	.822	.757
20	84,696,008	805,248	944,458	1,032,970	.853	.780
25	85,500,488	820,248	964,679	1,056,036	.850	.777
6–10	20,425,453	232,933	228,664	250,701	1.019	.929
15	32,576,701	362,841	396,532	444,211	.915	.817
20	37,448,073	463,896	484,631	546,753	.957	.848
25	38,252,553	478,896	504,852	569,819	.949	.840
11–15	12,151,248	129,908	167,868	193,510	.773	.671
20	17,022,620	230,963	255,967	296,052	.902	.780
25	17,827,100	245,963	276,188	319,118	.892	.771
16–20	4,871,372	101,055	88,099	102,542	1.147	.985
25	5,675,852	116,055	108,320	125,608	1.071	.924
21–25	804,480	15,000	20,221	23,066	.742	.650

TABLE V.—*Continued.*

41-45

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	35,883,121	352,707	397,058	433,721	.888	.813
10	51,991,886	549,647	618,228	688,426	.889	.798
15	61,522,309	695,117	793,802	892,611	.876	.779
20	65,269,767	778,112	888,801	1,000,911	.875	.777
25	65,942,287	805,622	914,188	1,028,893	.881	.783
6–10	16,108,765	196,940	221,170	254,705	.890	.773
15	25,639,188	342,410	396,744	458,890	.863	.746
20	29,386,646	425,405	491,743	567,190	.865	.750
25	30,059,166	452,915	517,230	595,172	.876	.761
11–15	9,530,423	145,470	175,574	204,185	.829	.712
20	13,277,881	228,465	270,573	312,485	.844	.731
25	13,950,401	255,975	296,060	340,467	.865	.752
16–20	3,747,458	82,995	94,999	108,300	.874	.766
25	4,419,978	110,505	120,386	136,282	.918	.811
21–25	67,520	27,510	25,387	27,982	1.084	.983

46-50

1– 5	23,069,926	270,100	311,180	357,604	.868	.755
10	33,513,966	455,420	502,088	579,678	.907	.786
15	38,981,062	624,275	644,228	741,390	.969	.842
20	40,875,546	714,505	715,315	819,806	.999	.872
25	41,235,706	727,295	735,813	841,472	.988	.864
6–10	10,444,040	185,320	190,908	222,074	.971	.834
15	15,911,136	354,175	333,048	383,786	1.063	.923
20	17,805,620	444,405	404,135	462,202	1.100	.961
25	18,165,780	457,195	424,633	483,868	1.077	.945
11–15	5,467,096	168,855	142,140	161,712	1.188	1.044
20	7,361,580	259,085	213,227	240,128	1.215	1.079
25	7,721,740	271,875	233,725	261,794	1.163	1.039
16–20	1,894,484	90,230	71,087	78,416	1.269	1.151
25	2,254,644	103,020	91,585	100,082	1.125	1.029
21–25	360,160	12,790	20,498	21,666	.624	.590

TABLE V.—*Continued.*

51-55

| Grouped Years of Membership. | Amount Exposed. | MORTALITY. | | | Ratio Actual to Probable Mortality. | |
| | | ACTUAL. | PROBABLE. | | | |
			American.	Actuaries.	American.	Actuaries.
1– 5	12,885,057	206,618	231,695	269,662	.892	.766
10	18,634,579	353,968	380,356	438,874	.931	.807
15	21,650,797	507,098	496,199	566,399	1.022	.895
20	22,391,232	562,518	538,072	610,687	1.045	.921
25	22,515,828	568,518	549,247	622,029	1.035	.914
6–10	5,749,522	147,350	148,661	169,212	.991	.871
15	8,765,740	300,480	264,504	296,737	1.136	1.013
20	9,506,175	355,900	306,377	341,025	1.162	1.044
25	9,630,771	361,900	317,552	352,367	1.140	1.027
11–15	3,016,218	153,130	115,843	127,525	1.322	1.201
20	3,756,653	208,550	157,716	171,813	1.322	1.214
25	3,881,249	214,550	168,891	183,155	1.270	1.171
16–20	740,435	55,420	41,873	44,288	1.324	1.251
25	865,031	61,420	53,048	55,630	1.158	1.104
21–25	124,596	6,000	11,175	11,342	.537	.529

56-60

| Grouped Years of Membership. | Amount Exposed. | MORTALITY. | | | Ratio Actual to Probable Mortality. | |
| | | ACTUAL. | PROBABLE. | | | |
			American.	Actuaries.	American.	Actuaries.
1– 5	7,050,518	174,100	182,773	207,989	.953	.837
10	10,042,986	295,850	299,009	335,806	.989	.881
15	11,668,223	390,225	395,596	437,393	.986	.892
20	12,115,797	427,570	434,001	476,480	.985	.897
25	12,162,553	428,770	439,829	482,247	.975	.889
6–10	2,992,468	121,750	116,236	127,817	1.047	.953
15	4,617,705	216,125	212,823	229,404	1.016	.942
20	5,065,279	253,470	251,228	268,491	1.009	.944
25	5,112,035	254,670	257,056	274,258	.991	.929
11–15	1,625,237	94,375	96,587	101,587	.977	.929
20	2,072,811	131,720	134,992	140,674	.976	.936
25	2,119,567	132,920	140,820	146,441	.944	.908
16–20	447,574	37,345	38,405	39,087	.972	.955
25	494,330	38,545	44,233	44,854	.871	.859
21–25	46,756	1,200	5,828	5,767	.206	.208

TABLE V.—*Continued.*

61-65

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.			
			American.	Actuaries.	American.	Actuaries.
1– 5	2,263,391	68,950	85,364	94,112	.808	.733
10	3,250,761	115,515	143,359	155,193	.806	.744
15	3,770,631	147,371	188,629	201,221	.781	.732
20	3,834,861	156,446	196,644	209,146	.797	.748
25	3,834,861	156,446	196,644	209,146	.797	.748
6–10	987,370	46,565	57,995	61,081	.803	.762
15	1,507,240	78,421	103,265	107,109	.759	.732
20	1,571,470	87,496	111,280	115,034	.786	.761
25	1,571,470	87,496	111,280	115,034	.786	.761
11–15	519,870	31,856	45,270	46,028	.704	.692
20	584,100	40,931	53,285	53,953	.768	.759
25	584,100	40,931	53,285	53,953	.768	.759
16–20	64,230	9,075	8,015	7,925	1.132	1.145
25	64,230	9,075	8,015	7,925	1.132	1.145
21–25						

66-71

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.			
			American.	Actuaries.	American.	Actuaries.
1– 5	303,725	30,000	17,623	18,585	1.702	1.614
10	362,225	39,000	23,214	24,234	1.680	1.609
15	370,594	41,125	24,342	25,333	1.689	1.623
20	372,594	41,125	24,745	25,699	1.662	1.600
25	372,594	41,125	24,745	25,699	1.662	1.600
6–10	58,500	9,000	5,591	5,649	1.610	1.593
15	66,869	11,125	6,719	6,748	1.656	1.649
20	68,869	11,125	7,122	7,114	1.562	1.564
25	68,869	11,125	7,122	7,114	1.562	1.564
11–15	8,369	2,125	1,128	1,099	1.884	1.934
20	10,369	2,125	1,531	1,465	1.388	1.451
25	10,369	2,125	1,531	1,465	1.388	1.451
16–20	2,000		403	366		
25	2,000		403	366		
21–25						

63

TABLE V.—*Continued.*

II-20

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.			
			American.	Actuaries.	American.	Actuaries.
1– 5	2,944,566	12,000	23,049	21,578	.521	.556
10	4,058,076	26,500	32,090	30,337	.826	.874
15	4,718,656	29,250	37,715	36,007	.776	.812
20	4,982,346	29,250	40,104	38,491	.729	.760
25	4,997,446	31,250	40,256	38,651	.776	.809
6–10	1,113,510	14,500	9,041	8,759	1.603	1.655
15	1,774,090	17,250	14,666	14,429	1.176	1.197
20	2,037,780	17,250	17,055	16,913	1.011	1.020
25	2,052,880	19,250	17,207	17,073	1.119	1.128
11–15	660,580	2,750	5,625	5,670	.489	.485
20	924,270	2,750	8,014	8,154	.343	.337
25	939,370	4,750	8,166	8,314	.582	.571
16–20	263,690		2,389	2,484		
25	278,790	2,000	2,541	2,644	.787	.756
21–25	15,100	2,000	152	160	13.158	12.500

21-30

Grouped Years of Membership.	Amount Exposed.	ACTUAL.	American.	Actuaries.	American.	Actuaries.
1– 5	71,268,546	443,696	591,499	583,763	.750	.760
10	100,643,934	677,131	850,711	849,971	.796	.798
15	118,019,286	820,575	1,017,369	1,025,546	.807	.800
20	124,997,842	929,510	1,091,996	1,106,373	.851	.840
25	126,004,892	932,510	1,104,861	1,120,977	.844	.832
6–10	29,375,388	233,435	259,212	266,208	901	.877
15	46,750,740	376,879	425,870	441,783	.885	.853
20	53,729,296	485,814	500,497	522,610	.971	.930
25	54,736,346	488,814	513,362	537,214	.952	.910
11–15	17,375,352	143,444	166,658	175,575	.861	.817
20	24,353,908	252,379	241,285	256,402	1.046	.984
25	25,360,958	255,379	254,150	271,006	1.005	.942
16–20	6,978,556	108,935	74,627	80,827	1.460	1.348
25	7,985,606	111,935	87,492	95,431	1.279	1.173
21–25	1,007,050	3,000	12,865	14,604	.233	.205

TABLE V.—*Continued.*

31-40

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	100,007,607	729,140	930,491	972,848	.784	.749
10	143,658,297	1,234,608	1,386,823	1,464,552	.890	.843
15	169,297,957	1,532,801	1,705,749	1,823,751	.898	.840
20	179,492,627	1,707,329	1,865,956	2,009,214	.915	.850
25	181,002,026	1,731,329	1,898,849	2,047,029	.912	.846
6–10	43,650,690	505,468	456,332	491,704	1.108	1.028
15	69,290,350	803,661	775,258	850,903	1.037	.945
20	79,485,020	978,189	935,465	1,036,366	1.046	.944
25	80,994,419	1,002,189	968,358	1,074,181	1.035	.933
11–15	25,639,660	298,193	318,926	359,199	.935	.830
20	35,834,330	472,721	479,133	544,662	.987	.868
25	37,343,729	496,721	512,026	582,477	.970	.853
16–20	10,194,670	174,528	160,207	185,463	1.089	.941
25	11,704,069	198,528	193,100	223,278	1.028	.889
21–25	1,509,399	24,000	32,893	37,815	.730	.635

41-50

1– 5	58,953,047	622,807	708,238	791,325	.879	.787
10	85,505,852	1,005,067	1,120,316	1,268,104	.897	.793
15	100,503,371	1,319,392	1,438,030	1,634,001	.917	.807
20	106,145,313	1,492,617	1,604,116	1,820,717	.930	.820
25	107,177,993	1,532,917	1,650,001	1,870,365	.929	.820
6–10	26,552,805	382,260	412,078	476,779	.928	.802
15	41,550,324	696,585	729,792	842,676	.954	.827
20	47,192,266	869,810	895,878	1,029,392	.971	.845
25	48,224,946	910,110	941,763	1,079,040	.966	.843
11–15	14,997,519	314,325	317,714	365,897	.989	.859
20	20,639,461	487,550	483,800	552,613	1.008	.882
25	21,672,141	527,850	529,685	602,261	.997	.876
16–20	5,641,942	173,225	166,086	186,716	1.043	.928
25	6,674,622	213,525	211,971	236,364	1.007	.903
21–25	1,032,680	40,300	45,885	49,648	.878	.812

TABLE V.—*Continued.*

51-60

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.			
			American.	Actuaries.	American.	Actuaries.
1– 5	19,935,575	380,718	414,468	477,651	.919	.797
10	28,677,565	649,818	679,365	774,680	.957	.839
15	33,319,020	897,323	891,795	1,003,792	1.006	.894
20	34,507,020	990,088	972,073	1,087,167	1.019	.911
25	34,678,381	997,288	989,076	1,104,276	1.008	.903
6–10	8,741,990	269,100	264,897	297,029	1.016	.906
15	13,383,445	516,605	477,327	526,141	1.082	.982
20	14,571,454	609,370	557,605	609,516	1.093	1.000
25	14,742,806	616,570	574,608	626,625	1.073	.984
11–15	4,641,455	247,505	212,430	229,112	1.165	1.080
20	5,829,464	340,270	292,708	312,487	1.162	1.089
25	6,000,816	347,470	309,711	329,596	1.122	1.054
16–20	1,188,009	92,765	80,278	83,375	1.156	1.113
25	1,359,361	99,965	97,281	100,484	1.028	.995
21–25	171,352	7,200	17,003	17,109	.423	.421

61-71

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.			
			American.	Actuaries.	American.	Actuaries.
1– 5	2,567,116	98,950	102,987	112,697	.961	.878
10	3,612,986	154,515	166,573	179,427	.928	.861
15	4,141,225	188,496	212,971	226,554	.885	.832
20	4,207,455	197,571	221,389	234,845	.892	.841
25	4,207,455	197,571	221,389	234,845	.892	.841
6–10	1,045,870	55,565	63,506	66,730	.874	.833
15	1,574,109	89,546	109,984	113,857	.814	.786
20	1,640,339	98,621	118,402	122,148	.833	.807
25	1,640,339	98,621	118,402	122,148	.833	.807
11–15	528,239	33,981	46,398	47,127	.732	.721
20	594,469	43,056	54,816	55,418	.785	.777
25	594,469	43,056	54,816	55,418	.785	.777
16–20	66,230	9,075	8,418	8,291	1.078	1.095
25	66,230	9,075	8,418	8,291	1.078	1.095
21–25						

TABLE V.—*Continued.*

II-25

| Grouped Years of Member-ship. | Amount Exposed. | MORTALITY. | | | Ratio Actual to Probable Mortality. | |
| | | ACTUAL. | PROBABLE. | | | |
			American.	Actuaries.	American.	Actuaries.
1- 5	26,265,856	147,965	211,336	203,051	.700	.729
10	36,351,329	227,715	296,447	288,178	.768	.790
15	42,177,095	263,650	348,762	342,389	.756	.770
20	44,676,408	290,765	373,167	368,192	.779	.790
25	45,004,503	292,765	376,807	372,171	.777	.787
6-10	10,085,473	79,750	85,111	85,127	.937	.937
15	15,911,239	115,685	137,426	139,338	.842	.830
20	18,410,552	142,800	161,831	165,141	.882	.865
25	18,738,647	144,800	165,471	169,120	.875	.856
11-15	5,825,766	35,935	52,315	54,211	.687	.663
20	8,325,079	63,050	76,720	80,014	.822	.788
25	8,653,174	65,050	80,360	83,993	.809	.774
16-20	2,499,313	27,115	24,405	25,803	1.111	1.051
25	2,827,408	29,115	28,045	29,782	1.038	.978
21-25	328,095	2,000	3,640	3,979	.549	.503

26-40

1- 5	147,954,863	1,036,871	1,333,703	1,375,138	.777	.754
10	212,008,978	1,710,524	1,973,177	2,056,682	.867	.832
15	249,858,804	2,118,976	2,412,071	2,542,915	.878	.833
20	264,796,407	2,375,324	2,624,889	2,785,886	.905	.853
25	266,999,861	2,402,324	2,667,159	2,834,486	.901	.848
6-10	64,054,115	673,653	639,474	681,544	1.053	.988
15	101,903,941	1,082,105	1,078,368	1,167,777	1.003	.927
20	116,841,544	1,338,453	1,291,186	1,410,748	1.037	.949
25	119,044,998	1,365,453	1,333,456	1,459,348	1.024	.936
11-15	37,849,826	408,452	438,894	486,233	.931	.840
20	52,787,429	664,800	651,712	729,204	1.021	.912
25	54,990,883	691,800	693,982	777,804	.997	.889
16-20	14,937,603	256,348	212,818	242,971	1.205	1.055
25	17,141,057	283,348	255,088	291,571	1.111	.972
21-25	2,203,454	27,000	42,270	48,600	.639	.556

TABLE V.—*Continued.*

41-55

Grouped Years of Member-ship.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	71,838,104	829,425	939,933	1,060,987	.882	.782
10	104,140,431	1,359,035	1,500,672	1,706,978	.906	.796
15	122,154,168	1,826,490	1,934,229	2,200,400	.944	.830
20	128,536,545	2,055,135	2,142,188	2,431,404	.959	.845
25	129,693,821	2,101,435	2,199,248	2,492,394	.956	.843
6–10	32,302,327	529,610	560,739	645,991	.944	.820
15	50,316,064	997,065	994,296	1,139,413	1.003	.875
20	56,698,441	1,225,710	1,202,255	1,370,417	1.020	.894
25	57,855,717	1,272,010	1,259,315	1,431,407	1.010	.889
11–15	18,013,737	467,455	433,557	493,422	1.078	.947
20	24,396,114	696,100	641,516	724,426	1.085	.961
25	25,553,390	742,400	698,576	785,416	1.063	.945
16–20	6,382,377	228,645	207,959	231,004	1.099	.990
25	7,539,653	274,945	265,019	291,994	1.037	.942
21–25	1,157,276	46,300	57,060	60,990	.811	.759

56-71

Grouped Years of Member-ship.	Amount Exposed.	ACTUAL.	American.	Actuaries.	American.	Actuaries.
1– 5	9,617,634	273,050	285,760	320,686	.956	.851
10	13,655,972	450,365	465,582	515,233	.967	.874
15	15,809,448	578,721	608,567	663,947	.951	.872
20	16,323,252	625,141	655,390	711,325	.954	.879
25	16,370,008	626,341	661,218	717,092	.947	.873
6–10	4,038,338	177,315	179,822	194,547	.986	.911
15	6,191,814	305,671	322,807	343,261	.947	.890
20	6,705,618	352,091	369,630	390,639	.953	.901
25	6,752,374	353,291	375,458	396,406	.941	.891
11–15	2,153,476	128,356	142,985	148,714	.898	.863
20	2,667,280	174,776	189,808	196,092	.921	.891
25	2,714,036	175,976	195,636	201,859	.900	.872
16–20	513,804	46,420	46,823	47,378	.991	.980
25	560,560	47,620	52,651	53,145	.904	.896
21–25	46,756	1,200	5,828	5,767	.206	.208

TABLE V.—*Continued.*

11-30

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1- 5	74,213,112	455,696	614,548	605,341	.742	.753
10	104,702,010	703,631	882,801	880,308	.797	.799
15	122,737,942	849,825	1,055,084	1,061,553	.805	.801
20	129,980,188	958,760	1,132,100	1,144,864	.847	.837
25	131,002,338	963,760	1,145,117	1,159,628	.842	.831
6-10	30,488,898	247,935	268,253	274,967	.924	.902
15	48,524,830	394,129	440,536	456,212	.895	.864
20	55,767,076	503,064	517,552	539,523	.972	.932
25	56,789,226	508,064	530,569	554,287	.958	.917
11-15	18,035,932	146,194	172,283	181,245	.849	.807
20	25,278,178	255,129	249,299	264,556	1.023	.964
25	26,300,328	260,129	262,316	279,320	.992	.931
16-20	7,242,246	108,935	77,016	83,311	1.414	1.308
25	8,264,396	113,935	90,033	98,075	1.265	1.162
21-25	1,022,150	5,000	13,017	14,764	.384	.339

31-50

Grouped Years of Membership.	Amount Exposed.	ACTUAL.	American.	Actuaries.	American.	Actuaries.
1- 5	158,960,654	1,351,947	1,638,729	1,764,173	.825	.766
10	229,164,149	2,239,675	2,507,139	2,732,656	.893	.820
15	269,801,328	2,852,193	3,143,779	3,457,752	.907	.825
20	285,637,940	3,199,946	3,470,072	3,829,931	.922	.836
25	288,180,019	3,264,246	3,548,850	3,917,394	.920	.833
6-10	70,203,495	887,728	868,410	968,483	1.022	.917
15	110,840,674	1,500,246	1,505,050	1,693,579	.997	.886
20	126,677,286	1,847,999	1,831,343	2,065,758	1.009	.895
25	129,219,365	1,912,299	1,910,121	2,153,221	1.001	.888
11-15	40,637,179	612,518	636,640	725,096	.962	.845
20	56,473,791	960,271	962,933	1,097,275	.997	.875
25	59,015,870	1,024,571	1,041,711	1,184,738	.984	.865
16-20	15,836,612	347,753	326,293	372,179	1.066	.934
25	18,378,691	412,053	405,071	459,642	1.017	.897
21-25	2,542,079	64,300	78,778	87,463	.816	.735

TABLE V.—*Continued.*

51-71

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	22,502,691	479,668	517,455	590,348	.927	.813
10	32,290,551	804,333	845,938	954,107	.951	.843
15	37,460,245	1,085,819	1,104,766	1,230,346	.983	.883
20	38,714,484	1,187,659	1,193,462	1,322,012	.995	.898
25	38,885,836	1,194,859	1,210,465	1,339,121	.987	.892
6–10	9,787,860	324,665	328,483	363,759	.988	.893
15	14,957,554	606,151	587,311	639,998	1.032	.947
20	16,211,793	707,991	676,007	731,664	1.047	.968
25	16,383,145	715,191	693,010	748,773	1.032	.955
11–15	5,169,694	281,486	258,828	276,239	1.088	1.019
20	6,423,933	383,326	347,524	367,905	1.103	1.042
25	6,595,285	390,526	364,527	385,014	1.071	1.014
16–20	1,254,239	101,840	88,696	91,666	1.148	1.111
25	1,425,591	109,040	105,699	108,775	1.032	1.002
21–25	171,352	7,200	17,003	17,109	.423	.421

11-35

1– 5	126,972,784	843,484	1,085,212	1,091,972	.777	.772
10	180,686,919	1,363,954	1,581,133	1,607,942	.863	.848
15	212,211,263	1,678,433	1,904,474	1,954,876	.881	.859
20	224,776,807	1,860,841	2,053,598	2,121,108	.906	.877
25	226,503,876	1,874,841	2,079,287	2,150,621	.902	.872
6–10	53,714,135	520,470	495,921	515,970	1.050	1.009
15	85,238,479	834,949	819,262	862,904	1.019	.968
20	97,804,023	1,017,357	968,386	1,029,136	1.051	.989
25	99,531,092	1,031,357	994,075	1,058,649	1.038	.974
11–15	31,524,344	314,479	323,341	346,934	.973	.906
20	44,089,888	496,887	472,465	513,166	1.052	.968
25	45,816,957	510,887	498,154	542,679	1.026	.941
16–20	12,565,544	182,408	149,124	166,232	1.223	1.097
25	14,292,613	196,408	174,813	195,745	1.124	1.003
21–25	1,727,069	14,000	25,689	29,513	.545	.474

TABLE V.—*Continued.*

36-71

Grouped Years of Membership.	Amount Exposed.	MORTALITY.			Ratio Actual to Probable Mortality.	
		ACTUAL.	PROBABLE.		American.	Actuaries.
			American.	Actuaries.		
1– 5	128,703,673	1,443,827	1,685,520	1,867,890	.857	.773
10	185,469,791	2,383,685	2,654,745	2,959,129	.898	.806
15	217,788,252	3,109,404	3,399,155	3,794,775	.915	.819
20	229,555,805	3,485,524	3,742,036	4,175,699	.931	.835
25	231,564,317	3,548,024	3,825,145	4,265,522	.928	.832
6–10	56,766,118	939,858	969,225	1,091,239	.970	.861
15	89,084,579	1,665,577	1,713,635	1,926,885	.972	.864
20	100,852,132	2,041,697	2,056,516	2,307,809	.993	.885
25	102,860,644	2,104,197	2,139,625	2,397,632	.983	.878
11–15	32,318,461	725,719	744,410	835,646	.975	.868
20	44,086,014	1,101,839	1,087,291	1,216,570	1.013	.906
25	46,094,526	1,164,339	1,170,400	1,306,393	.995	.891
16–20	11,767,553	376,120	342,881	380,924	1.097	.987
25	13,776,065	438,620	425,990	470,747	1.030	.932
21–25	2,008,512	62,500	83,109	89,823	.752	.696

TABLE VI.

MORTALITY TABLE CONSTRUCTED FROM EXPERIENCE, 1860-1885.   UNADJUSTED.

Age.	l_x	d_x	$\dfrac{d_x}{l_x}$	Age.	l_x	d_x	$\dfrac{d_x}{l_x}$
10	100,000	676	.006760	48	75,269	1,099	.014606
11	99,324	674	.006786	49	74,170	900	.012128
12	98,650	672	.006812	50	73,270	736	.010047
13	97,978	671	.006848	51	72,534	563	.007764
14	97,307	671	.006896	52	71,971	983	.013653
15	96,636	671	.006943	53	70,988	1,123	.015824
16	95,965	672	.007003	54	69,865	1,307	.018710
17	95,293	673	.007062	55	68,558	1,212	.017668
18	94,620	392	.004141	56	67,346	1,059	.015735
19	94,228	1,146	.012161	57	66,287	1,244	.018768
20	93,082	439	.004720	58	65,043	1,609	.024739
21	92,643	264	.002846	59	63,434	1,383	.021796
22	92,379	268	.002903	60	62,051	1,854	.029881
23	92,111	828	.008992	61	60,197	1,776	.029498
24	91,283	523	.005733	62	58,421	2,526	.043239
25	90,760	408	.004489	63	55,895	1,863	.033333
26	90,352	569	.006297	64	54,032	2,543	.047065
27	89,783	635	.007077	65	51,489	1,653	.032094
28	89,148	507	.005682	66	49,836	2,430	.048775
29	88,641	439	.004954	67	47,406	2,494	.052599
30	88,202	597	.006765	68	44,912	4,514	.100504
31	87,605	560	.006394	69	40,398	2,306	.057100
32	87,045	596	.006850	70	38,092	1,939	.050889
33	86,449	574	.006644	71	36,153	1,394	.038556
34	85,875	801	.009324	72	34,759	1,570	.045172
35	85,074	602	.007075	73	33,189	2,141	.064503
36	84,472	485	.005747	74	31,048	586	.018868
37	83,987	687	.008173	75	30,462	3,189	.104705
38	83,300	500	.006008	76	27,273	473	.017339
39	82,800	735	.008869	77	26,800	4,230	.157834
40	82,065	787	.009594	78	22,570	3,842	.170214
41	81,278	836	.010291	79	18,728	3,813	.203589
42	80,442	740	.009198	80	14,915	2,417	.162088
43	79,702	1,053	.013202	81	12,498	1,893	.151436
44	78,649	687	.008735	82	10,605	1,730	.163194
45	77,962	925	.011874	83	8,875	1,562	.175912
46	77,037	948	.012299	84	7,313	1,387	.189678
47	76,089	820	.010780				

TABLE VII.

GRADUATED MORTALITY TABLE CONSTRUCTED FROM EXPERIENCE. 1860–1885.

Age.	l_x	d_x	$\dfrac{d_x}{l_x}$	$\log l_x$	$\log d_x$	$\log \dfrac{d_x}{l_x}$
10	100,000	548	.005480	5.000 0000	2.738 7806	$\overline{3}$.738 7552
11	99,452	546	.005488	4.997 6135	.737 0335	.739 4056
12	98,906	544	.005499	.995 2236	.735 5191	.740 2771
13	98,362	542	.005513	.992 8288	.734 1595	.741 3979
14	97,820	541	.005531	.990 4280	.733 2775	.742 7961
15	97,279	540	.005553	.988 0192	.732 5546	.744 4998
16	96,739	540	.005579	.985 6009	.732 1524	.746 5371
17	96,199	540	.005610	.983 1712	.732 0719	.748 9365
18	95,659	540	.005646	.980 7279	.732 4742	.751 7255
19	95,119	541	.005688	.978 2690	.733 2775	.754 9325
20	94,578	542	.005732	.975 7917	.734 0794	.758 3166
21	94,036	543	.005780	.973 2952	.735 1995	.761 9587
22	93,493	546	.005836	.970 7777	.736 8744	.766 0978
23	92,947	548	.005895	.968 2358	.738 7013	.770 4931
24	92,399	551	.005960	.965 6681	.740 9151	.775 2227
25	91,848	554	.006032	.963 0720	.743 5098	.780 4420
26	91,294	558	.006110	.960 4444	.746 5564	.786 0672
27	90,737	562	.006198	.957 7827	.749 9681	.792 2487
28	90,174	567	.006293	.955 0826	.753 9659	.798 8240
29	89,607	573	.006398	.952 3410	.758 3819	.806 0148
30	89,033	580	.006512	.949 5535	.763 2782	.813 7327
31	88,454	587	.006639	.946 7160	.768 8600	.822 1137
32	87,866	596	.006779	.943 8231	.774 9547	.831 1391
33	87,271	605	.006931	.940 8690	.781 6836	.840 7892
34	86,666	615	.007099	.937 8485	.789 0163	.851 1844
35	86,051	627	.007284	.934 7544	.797 1290	.862 3655
36	85,424	640	.007487	.931 5794	.805 9085	.874 2984
37	84,784	654	.007709	.928 3156	.815 3120	.887 0154
38	84,131	669	.007954	.924 9546	.825 5559	.900 6073
39	83,461	686	.008224	.921 4864	.836 5773	.915 0893
40	82,775	705	.008521	.917 9000	.848 3739	.930 4699
41	82,070	726	.008845	.914 1836	.860 8768	.946 6918
42	81,344	748	.009202	.910 3252	.874 1918	.963 8743
43	80,595	773	.009595	.906 3103	.888 3480	.982 0607
44	79,822	800	.010027	.902 1231	.903 3071	2.001 1739
45	79,022	830	.010500	.897 7464	.918 9211	.021 1936
46	78,192	862	.011022	.893 1622	.935 4569	.042 2487
47	77,330	896	.011593	.888 3488	.952 5503	.064 2009
48	76,434	934	.012221	.883 2846	.970 3469	.087 1140
49	75,500	975	.012912	.877 9444	.988 9601	.110 9927
50	74,525	1,019	.013669	.872 3003	3.008 0463	.135 7508

TABLE VII.—*Continued.*

Age.	l_x	d_x	$\dfrac{d_x}{l_x}$	$\log l_x$	$\log d_x$	$\log \dfrac{d_x}{l_x}$
51	73,506	1,066	.014502	4.866 3229	3.027 7572	2.161 4367
52	72,440	1,117	.015417	.859 9786	.047 9754	.188 0103
53	71,323	1,171	.016421	.853 2309	.068 6311	.215 4005
54	70,152	1,229	.017524	.846 0402	.089 6579	.243 6213
55	68,923	1,291	.018734	.838 3622	.110 9935	.272 6203
56	67,631	1,357	.020063	.830 1489	.132 5478	.302 3921
57	66,275	1,426	.021522	.821 3472	.154 2413	.332 8789
58	64,848	1,499	.023122	.811 8982	.175 9175	.364 0153
59	63,349	1,576	.024878	.801 7386	.197 5562	.395 8170
60	61,773	1,656	.026804	.790 7976	.218 9816	.428 2078
61	60,117	1,738	.028918	.778 9978	.240 1747	.461 1703
62	58,379	1,824	.031237	.766 2537	.260 9296	.494 6650
63	56,555	1,910	.033778	.752 4713	.281 1016	.528 6389
64	54,645	1,998	.036562	.737 5482	.300 5737	.563 0330
65	52,647	2,086	.039616	.721 3720	.319 2518	.597 8705
66	50,561	2,172	.042960	.703 8169	.336 8798	.633 0625
67	48,389	2,256	.046622	.684 7470	.353 3198	.668 5866
68	46,133	2,336	.050629	.664 0122	.368 4171	.704 4005
69	43,797	2,410	.055017	.641 4482	.381 9450	.740 4999
70	41,388	2,476	.059817	.616 8722	.393 6980	.776 8222
71	38,912	2,532	.065061	.590 0846	.403 4122	.813 3186
72	36,380	2,575	.070794	.560 8678	.410 8616	.849 9962
73	33,805	2,605	.077052	.528 9798	.415 7577	.886 7854
74	31,200	2,617	.083884	.494 1571	.417 8369	.923 6816
75	28,583	2,611	.091336	.456 1075	.416 7570	.960 6423
76	25,972	2,583	.099457	.414 5108	.412 1412	.997 6343
77	23,389	2,533	.108295	.369 0152	.403 6180	1.034 6092
78	20,856	2,459	.117909	.319 2365	.390 7939	.071 5455
79	18,397	2,361	.128358	.264 7499	.373 1696	.108 4240
80	16,036	2,240	.139695	.205 0881	.350 2674	.145 1815
81	13,796	2,097	.151985	.139 7405	.321 5363	.181 7996
82	11,699	1,934	.165295	.068 1441	.286 4116	.218 2594
83	9,765	1,755	.179677	3.989 6771	.244 1781	.254 4928
84	8,010	1,563	.195192	.903 6620	.194 0979	.290 4623
85	6,447	1,366	.211922	.809 3543	.135 5461	.326 1767
86	5,081	1,168	.229876	.705 9235	.067 4057	.361 4936
87	3,913	975	.249174	.592 4841	2.989 0046	.396 5028
88	2,938	793	.269792	.468 0235	.899 0541	.431 0289
89	2,145	626	.291784	.331 4700	.796 5050	.465 0616
90	1,519	479	.315199	.181 6358	.680 2448	.498 5844
91	1,040	354	.340037	.017 2002	.548 7578	.531 5256
92	687	252	.366470	2.836 7198	.400 7106	.564 0386
93	435	171	.393830	.638 4870	.233 7574	.595 3084
94	264	112	.424582	.421 0814	.049 2180	.627 9613
95	152	70	.461981	.181 0648	1.845 7180	.664 6238
96	82	42	.510413	1.911 8624	.619 0933	.707 9220
97	40	23	.576080	.601 6923	.363 6120	.760 4824
98	17	11	.668238	.228 9762	.053 0784	.824 9313
99	6	4	.801484	0.749 8028	0.653 2125	.903 8951
100	1	1	1.000000	.047 5983	.047 5983	0.000 0000

TABLE VIII.

RATIO OF OTHER MORTALITY TABLES TO WASHINGTON[25] GRADUATED.

Age.	American.	Actuaries.	Mutual.	Mutual Benefit.	30 Offices.	H^m.	H^m(5).	Washington Actual.
15		.						
16								
17								
18	1.369	1.264	1.082		1.184	.849	.965	.733
19	1.365	1.267	1.077		1.181	1.010	1.181	2.138
20	1.362	1.272	1.072		1.180	1.104	1.453	.823
21	1.359	1.276	1.067		1.178	1.163	1.671	.492
22	1.355	1.279	1.061		1.175	1.173	1.762	.497
23	1.350	1.283	1.055		1.172	1.147	1.817	1.525
24	1.344	1.286	1.048		1.170	1.114	1.816	.962
25	1.337	1.288	1.041	1.096	1.166	1.099	1.742	.744
26	1.330	1.291	1.034	1.091	1.164	1.094	1.647	1.031
27	1.323	1.292	1.026	1.085	1.160	1.114	1.604	1.142
28	1.313	1.293	1.018	1.078	1.156	1.140	1.542	.903
29	1.304	1.293	1.009	1.072	1.154	1.162	1.478	.774
30	1.294	1.294	1.000	1.066	1.149	1.186	1.413	1.039
31	1.282	1.292	.991	1.059	1.145	1.192	1.382	.963
32	1.270	1.290	.981	1.051	1.140	1.195	1.366	1.010
33	1.258	1.287	.971	1.044	1.136	1.195	1.331	.959
34	1.244	1.281	.961	1.036	1.131	1.198	1.328	1.313
35	1.228	1.275	.950	1.028	1.127	1.205	1.373	.971
36	1.214	1.267	.940	1.020	1.121	1.217	1.382	.768
37	1.198	1.257	.929	1.012	1.114	1.228	1.388	1.060
38	1.183	1.245	.918	1.004	1.110	1.230	1.391	.755
39	1.166	1.232	.907	.996	1.104	1.226	1.361	1.078
40	1.149	1.216	.897	.988	1.098	1.209	1.328	1.126
41	1.131	1.200	.886	.980	1.091	1.186	1.279	1.163
42	1.114	1.184	.876	.972	1.087	1.166	1.258	1.000
43	1.096	1.173	.866	.964	1.079	1.160	1.234	1.376
44	1.080	1.167	.857	.957	1.073	1.152	1.222	.871
45	1.063	1.163	.848	.950	1.067	1.161	1.233	1.131
46	1.049	1.165	.839	.943	1.060	1.174	1.239	1.116
47	1.035	1.166	.832	.937	1.055	1.182	1.242	.930

TABLE VIII.—*Continued.*

Age.	American.	Actuaries.	Mutual.	Mutual Benefit.	30 Offices.	Hm.	Hm(5).	Washington Actual.
48	1.024	1.167	.825	.931	1.049	1.182	1.253	1.195
49	1.015	1.166	.818	.925	1.042	1.179	1.260	.939
50	1.008	1.166	.813	.921	1.037	1.167	1.252	.735
51	1.003	1.165	.808	.916	1.031	1.149	1.242	.535
52	.998	1.164	.805	.913	1.026	1.138	1.219	.886
53	.995	1.163	.802	.910	1.020	1.133	1.213	.964
54	.993	1.159	.800	.907	1.015	1.126	1.195	1.068
55	.991	1.156	.800	.906	1.010	1.123	1.184	.943
56	.991	1.153	.800	.905	1.005	1.119	1.172	.784
57	.991	1.147	.801	.904	1.002	1.115	1.165	.872
58	.992	1.141	.804	.905	.997	1.108	1.149	1.070
59	.994	1.135	.807	.905	.993	1.107	1.140	.876
60	.996	1.132	.811	.908	.990	1.107	1.143	1.114
61	.999	1.128	.816	.910	.987	1.108	1.138	1.020
62	1.002	1.124	.822	.913	.983	1.109	1.139	1.384
63	1.005	1.120	.829	.917	.980	1.110	1.140	.987
64	1.009	1.117	.837	.921	.978	1.105	1.141	1.287
65	1.013	1.113	.846	.926	.975	1.096	1.126	.810
66	1.017	1.108	.855	.932	.973	1.084	1.114	1.135
67	1.022	1.104	.866	.938	.971	1.070	1.093	1.128
68	1.027	1.099	.876	.945	.969	1.051	1.075	1.985
69	1.032	1.092	.888	.952	.968	1.042	1.056	1.038
70	1.036	1.086	.900	.960	.966	1.040	1.050	.851
71	1.040	1.078	.913	.969	.965	1.046	1.054	.593
72	1.042	1.071	.926	.978	.964	1.059	1.067	.638
73	1.041	1.063	.940	.988	.962	1.075	1.083	.837
74	1.037	1.055	.954	.999	.962	1.087	1.100	.225
75	1.033	1.046	.969	1.010	.961	1.077	1.089	1.146
76	1.029	1.037	.984	1.022	.960	1.070	1.087	.174
77	1.026	1.029	1.000	1.035	.960	1.059	1.066	1.457
78	1.025	1.021	1.016	1.049	.959	1.045	1.057	1.444
79	1.026	1.013	1.032	1.063	.960	1.037	1.051	1.586
80	1.034	1.005	1.048	1.079	.960	1.035	1.043	1.160

TABLE IX.

NET ANNUAL PREMIUMS AND $1 + a_x$ BY AMERICAN, ACTUARIES, AND WASHINGTON[25] EX. 4% COMPARED.

Age.	NET ANNUAL PREMIUM FOR $10,000. LIFE POLICIES, CONTINUED PREMIUMS.			PRESENT VALUE OF AN ANNUITY OF $1. FIRST PAYMENT IMMEDIATE. $1 + a_x$		
	Washington[25].	American.	Actuaries.	Washington[25].	American.	Actuaries.
25	$130.93	$142.11	$147.22	$19.3969	$18.9854	$18.8027
26	134.89	145.70	151.29	19.2489	18.8568	18.6598
27	139.07	149.48	155.57	19.0956	18.7233	18.5122
28	143.46	153.46	160.05	18.9368	18.5846	18.3597
29	148.08	157.67	164.77	18.7724	18.4404	18.2023
30	152.95	162.11	169.72	18.6023	18.2906	18.0396
31	158.09	166.80	174.92	18.4264	18.1351	17.8718
32	163.49	171.76	180.40	18.2446	17.9735	17.6985
33	169.19	177.00	186.16	18.0567	17.8056	17.5196
34	175.21	182.55	192.25	17.8628	17.6316	17.3350
35	181.55	188.42	198.66	17.6627	17.4510	17.1444
36	188.24	194.64	205.44	17.4564	17.2634	16.9475
37	195.31	201.24	212.60	17.2437	17.0691	16.7443
38	202.77	208.24	220.18	17.0247	16.8676	16.5342
39	210.65	215.66	228.23	16.7993	16.6591	16.3172
40	218.97	223.54	236.77	16.5676	16.4431	16.0929
41	227.78	231.92	245.86	16.3294	16.2196	15.8610
42	237.09	240.84	255.54	16.0848	15.9884	15.6212
43	246.85	250.33	265.85	15.8399	15.7494	15.3736
44	257.37	260.44	276.82	15.5768	15.5025	15.1186
45	268.41	271.22	288.45	15.3134	15.2477	14.8571
46	280.11	282.73	300.80	15.0439	14.9849	14.5896
47	292.51	294.99	313.85	14.7684	14.7144	14.3170
48	305.65	308.09	327.67	14.4871	14.4362	14.0394
49	319.60	322.07	342.27	14.2001	14.1506	13.7571
50	334.41	336.97	357.75	13.9077	13.8583	13.4703
51	350.14	352.87	374.15	13.6100	13.5595	13.1792
52	366.84	369.84	391.51	13.3074	13.2546	12.8841
53	384.61	387.94	409.96	13.0002	12.9440	12.5853
54	403.50	407.28	429.50	12.6885	12 6280	12.2832
55	423.60	427.92	450.25	12.3729	12.3072	11.9779
56	445.01	449.97	472.30	12.0536	11.9820	11.6698
57	467.82	473.53	495.71	11.7311	11.6530	11.3593
58	492.13	498.72	520.67	11.4058	11.3207	11.0463
59	518.06	525.68	547.24	11.0782	10.9855	10.7313
60	545.72	554.52	575.56	10.7488	10.6481	10.4149
61	575.27	585.39	605.72	10.4179	10.3092	10.0977
62	606.82	618.44	637.82	10.0863	9.9695	9.7805
63	640.55	653.85	671.99	9.7545	9.6296	9.4641
64	676.62	691.80	708.41	9.4230	9.2901	9.1489
65	715.22	732.48	747.18	9.0923	8.9518	8.8355
66				8.7632	8.6156	8.5248
67				8.4361	8.2823	8.2170
68				8.1117	7.9525	7.9130
69				7.7906	7.6272	7.6130
70				7.4734	7.3070	7.3172

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TABLE IX.—*Continued.*

NET ANNUAL PREMIUMS FOR $10,000.

Age.	LIFE POLICIES—10 ANNUAL PAYMENTS.			LIFE POLICIES—20 ANNUAL PAYMENTS.		
	Washington[25].	American.	Actuaries.	Washington[25].	American.	Actuaries.
25	309.04	331.00	339.41	189.75	204.58	209.96
26	316.10	337.17	346.35	194.23	208.50	214.41
27	323.43	343.59	353.52	198.90	212.58	219.01
28	331.04	350.27	360.94	203.76	216.84	223.80
29	338.94	357.22	368.63	208.83	221.30	228.78
30	347.13	364.45	376.58	214.10	225.94	233.95
31	355.63	371.98	384.80	219.60	230.80	239.32
32	364.44	379.81	393.31	225.33	235.87	244.91
33	373.57	387.97	402.10	231.31	241.19	250.74
34	383.04	396.45	411.20	237.54	246.74	256.81
35	392.85	405.28	420.62	244.04	252.56	263.16
36	403.01	414.48	430.38	250.82	258.67	269.79
37	413.54	424.04	440.50	257.90	265.07	276.74
38	424.44	434.00	451.01	265.29	271.79	284.03
39	435.73	444.36	461.95	273.01	278.85	291.70
40	447.41	455.14	473.35	281.08	286.28	299.79
41	459.51	466.36	485.26	289.53	294.10	308.38
42	472.04	478.06	497.72	298.37	302.36	317.37
43	484.64	490.26	510.78	307.63	311.07	326.94
44	498.42	502.99	524.40	317.35	320.29	337.07
45	512.31	516.26	538.58	327.54	330.05	347.73
46	526.69	530.12	553.31	338.25	340.40	359.00
47	541.58	544.58	568.51	349.43	351.38	370.81
48	557.01	559.69	584.26	361.39	363.05	383.25
49	572.99	575.45	600.54	373.92	375.46	396.35
50	589.56	591.89	617.42	387.14	388.65	410.18
51	606.74	609.02	634.88	401.12	402.68	424.79
52	624.57	626.87	652.97	415.94	417.63	440.23
53	643.09	645.50	671.72	431.66	433.58	456.64
54	662.34	664.94	691.17	448.36	450.63	473.99
55	682.36	685.24	711.40	466.14	468.85	492.40
56	703.22	706.47	732.48	485.10	488.37	512.02
57	724.43	728.69	754.43	505.34	509.29	532.93
58	747.68	751.98	777.45	527.00	531.75	555.32
59	771.44	776.44	801.51	550.20	555.86	579.25
60	796.34	802.16	826.83	575.09	581.81	604.89
61	822.46	829.27	853.39			
62	849.94	857.89	881.32			
63	878.90	888.16	910.68			
64	909.49	920.27	941.64			
65	941.87	954.37	974.29			

TABLE IX.—*Continued.*

NET ANNUAL PREMIUMS FOR $10,000.

Age.	10 Year Endowment Policies.			20 Year Endowment Policies.		
	Washington[25].	American.	Actuaries.	Washington[25].	American.	Actuaries.
25	832.25	842.25	841.48	362.54	373.65	373.83
26	832.77	842.64	842.21	363.41	374.28	374.82
27	833.33	843.05	842.89	364.37	374.95	375.87
28	833.96	843.49	843.70	365.43	375.68	377.01
29	834.65	843.98	844.49	366.59	376.49	378.17
30	835.41	844.50	845.36	367.87	377.38	379.51
31	836.24	845.07	846.30	369.27	378.36	380.88
32	837.16	845.70	847.14	370.81	379.45	382.46
33	838.16	846.39	848.23	372.51	380.66	384.14
34	839.27	847.13	849.26	374.38	382.00	385.94
35	840.49	847.95	850.32	376.43	383.50	388.01
36	841.82	848.87	851.49	378.68	385.18	390.24
37	843.29	849.88	852.76	381.16	387.07	392.76
38	844.92	851.00	854.23	383.89	389.19	395.51
39	846.70	852.24	855.84	386.88	391.56	398.71
40	848.66	853.62	857.59	390.18	394.23	402.16
41	850.81	855.16	859.72	393.80	397.22	405.98
42	853.18	856.91	862.29	397.78	400.60	410.47
43	855.15	858.90	865.13	402.16	404.40	415.30
44	858.66	861.16	868.37	406.98	408.67	420.78
45	861.81	863.73	872.02	412.28	413.47	426.78
46	865.28	866.67	876.15	418.10	418.87	433.42
47	869.10	870.00	880.61	424.39	424.91	440.64
48	873.30	873.78	885.47	431.54	431.67	448.51
49	877.93	878.05	890.73	439.28	439.22	457.10
50	883.02	882.84	896.56	447.78	447.63	466.49
51	888.62	888.20	902.93	457.13	456.97	476.80
52	894.79	894.17	909.73	467.41	467.34	488.10
53	901.58	900.84	917.28	478.71	478.83	500.30
54	909.07	908.27	925.49	491.12	491.57	513.70
55	917.31	916.53	934.48	504.76	505.65	528.40
56	926.39	925.72	944.35	519.74	521.19	544.37
57	935.69	935.94	955.14	536.19	538.33	561.82
58	947.41	947.29	967.41	554.25	557.19	580.90
59	959.56	959.91	979.91	574.06	577.95	601.74
60	972.96	973.93	994.70	595.79	600.74	624.49
61	987.74	989.51	1,010.70			
62	1,004.03	1,006.80	1,028.10			
63	1,022.01	1,025.99	1,047.30			
64	1,041.85	1,047.29	1,068.30			
65	1,063.75	1,070.88	1,091.20			

TABLE

LIFE AND ENDOWMENT POLICIES

	MORTALITY				
	EXPOSED TO RISK.				
	LIFE AND ENDOWMENT				
	Number of Policies.	Amount of Policies.	Reversionary Additions.	Policies and Additions.	Average Amt. of Policies.
A section of WASHINGTON experience.	112,041	$238,972,497	$7,336,145	$246,308,642	$2,133
Totals of 3 companies for 1885, 1886, and 1887.	956,160	$3,067,765,322	$108,192,822	$3,175,958,144	$3,208

RATIO OF ACTUAL TO

		LIFE AND ENDOWMENT			
		AMOUNT EXPOSED.		ACTUAL MORTALITY.	
		Policies.	Additions.	Policies.	Additions.
A section of WASHINGTON experience.	Life	159,466,174	6,034,642	2,515,533	139,604
	Endowment.	79,506,323	1,301,503	583,873	10,965
	Total . . .	$238,972,497	$7,336,145	$3,099,406	$150,569
Totals of 1 company for 1885, 1886, and 1887.	Life	576,814,000	8,809,912	7,765,995	204,622
	Endowment.	244,419,000	2,775,663	1,913,567	37,514
	Total . . .	$821,233,000	$11,585,575	$9,679,562	$242,136

AND REVERSIONARY ADDITIONS.

RATE.

Number of Policies.	Amount of Policies.	Reversionary Additions.	Policies and Additions.	Average Amt. of Policies.	Policies.	Additions.	Policies and Additions.
	DEATHS. COMBINED.				MORTALITY RATE.		
1,313	$3,099,406	$150,569	$3,249,975	$2,361	1.297	2.052	1.319
11,776	$39,727,468	$3,137,594	$42,865,062	$3,374	1.295	2.900	1.350

PROBABLE MORTALITY.

SEPARATED. PROBABLE MORTALITY.				RATIO ACTUAL TO PROBABLE MORTALITY.			
AMERICAN.		ACTUARIES.		AMERICAN.		ACTUARIES.	
Policies.	Additions.	Policies.	Additions.	Policies	Additions.	Policies.	Additions.
2,703,235	135,489	2,967,957	148,632	.931	1.030	.848	.939
884,987	18,596	949,796	20,695	.660	.590	.615	.530
$3,588,222	$154,085	$3,917,753	$169,327	.864	.977	.791	.889
8,956,000	197,205	9,747,000	216,700	.870	1.038	.800	.944
2,870,000	38,764	3,097,000	42,749	.670	.967	.620	.877
$11,826,000	$235,969	$12,844,000	$259,449	.820	1.026	.750	.933

Diagram A exhibits (on a scale) what is shown by figures in Table II.

The zigzag black line indicates, by the spaces below it, the amount of losses incurred in the twenty-five years, at each age (the youngest age being 18, the oldest age 80 ; the total amount exposed to risk, $458,068,193 ; the total amount of losses, $5,422,865).

The broken black line indicates the amount of losses at each age by a scale graduating the actual mortality, the total area included within the continuous and broken black lines respectively being the same. The spaces included within the other lines indicate how much the losses would have been by the several tables, at the same ages and on the same amount exposed to risk.
82

ACTUAL AMOUNT OF DEATHS AT EACH AGE
COMPARED WITH THE PROBABLE AMOUNT BY OTHER TABLES.
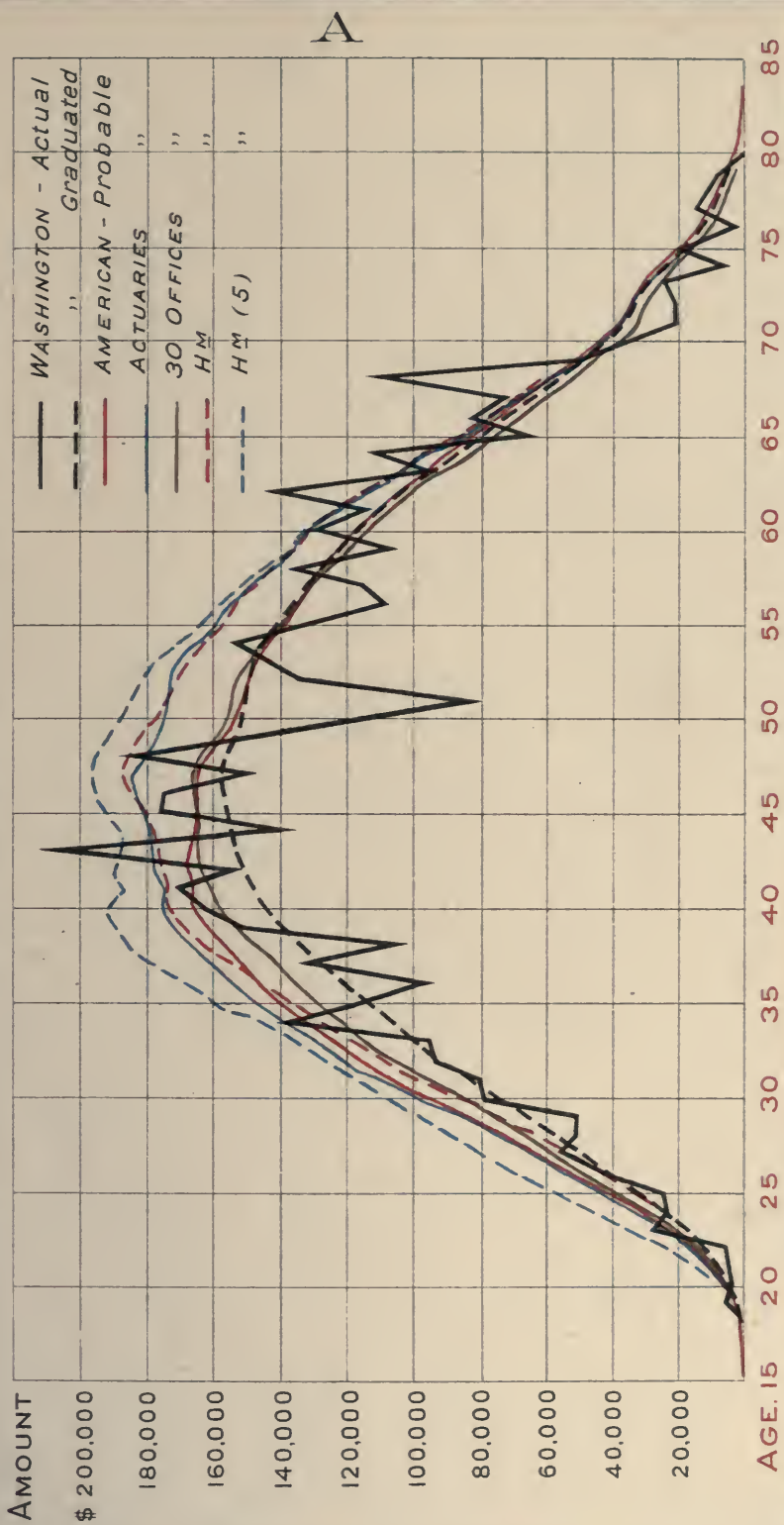
Diagram B exhibits the actual and probable amount of losses on $458,068,193, exposed to risk for each group of five ages, in the twenty-five years, as shown by Table III. The irregularities of Diagram A are not so apparent.

The black line incloses the area indicating the actual losses, and at a glance, shows, for the most part, the actual mortality much less than the computed amount by the other tables, particularly by the American and Actuaries' tables on which the premiums and reserves are based.

84

ACTUAL AMOUNT OF DEATHS COMPARED WITH THE PROBABLE AMOUNTS BY OTHER TABLES — BY GROUPS OF FIVE YEARS OF AGE.
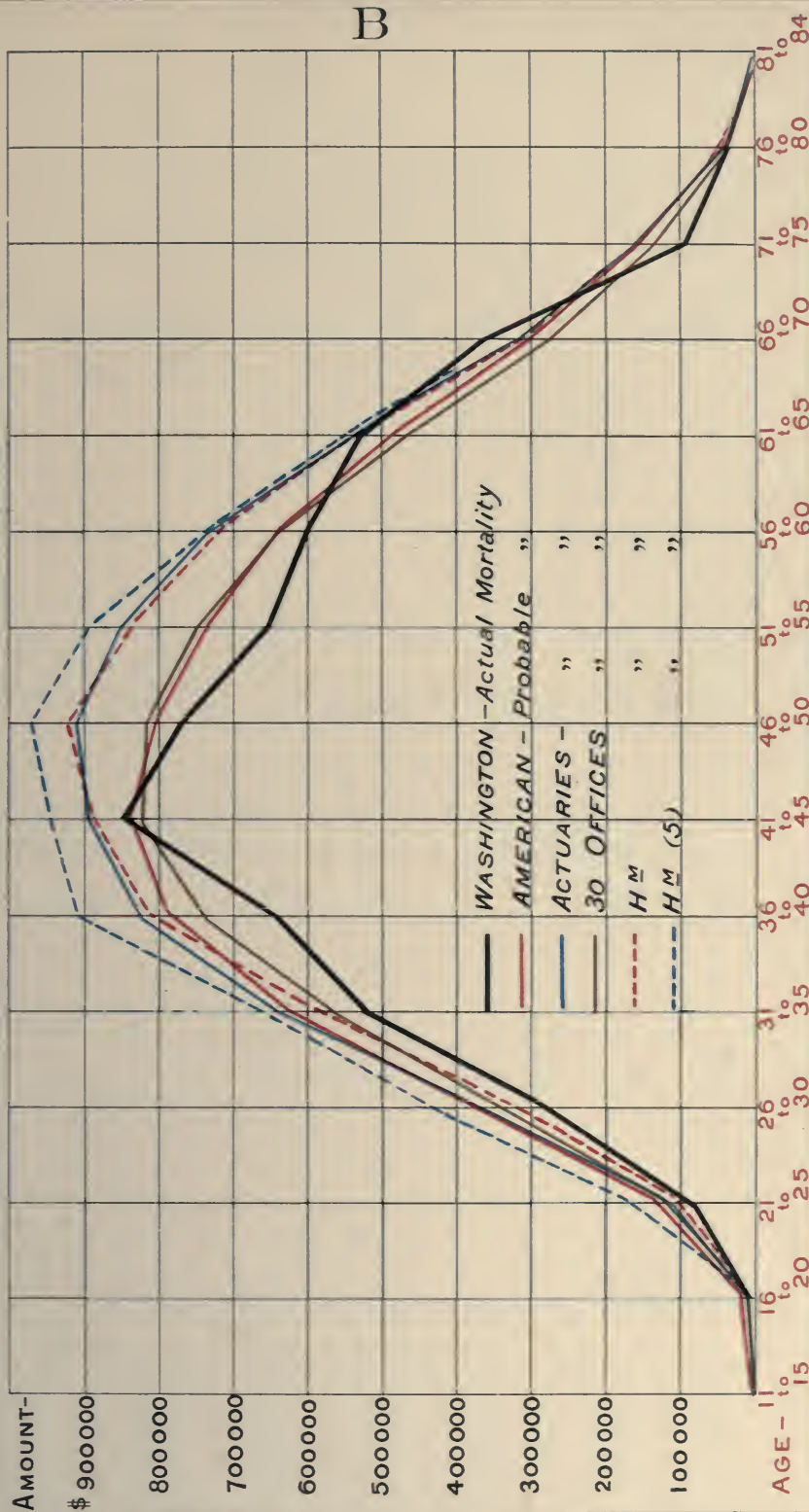
Diagram C exhibits at once, by years of membership, the rate of mortality by the several tables, compared with the actual experience of the Washington, graduated, as seen in Table IV.

It shows the expected rate of mortality by the standard tables to be higher in the early years of membership than the actual rate, especially by the five-year groups, and indicates when the benefit of medical selection disappears.

86

COMPARISON OF THE PROBABLE MORTALITY BY OTHER TABLES WITH THE ACTUAL MORTALITY OF THE WASHINGTON, BY YEARS OF MEMBERSHIP, SHOWING THE EFFECT OF MEDICAL SELECTION.
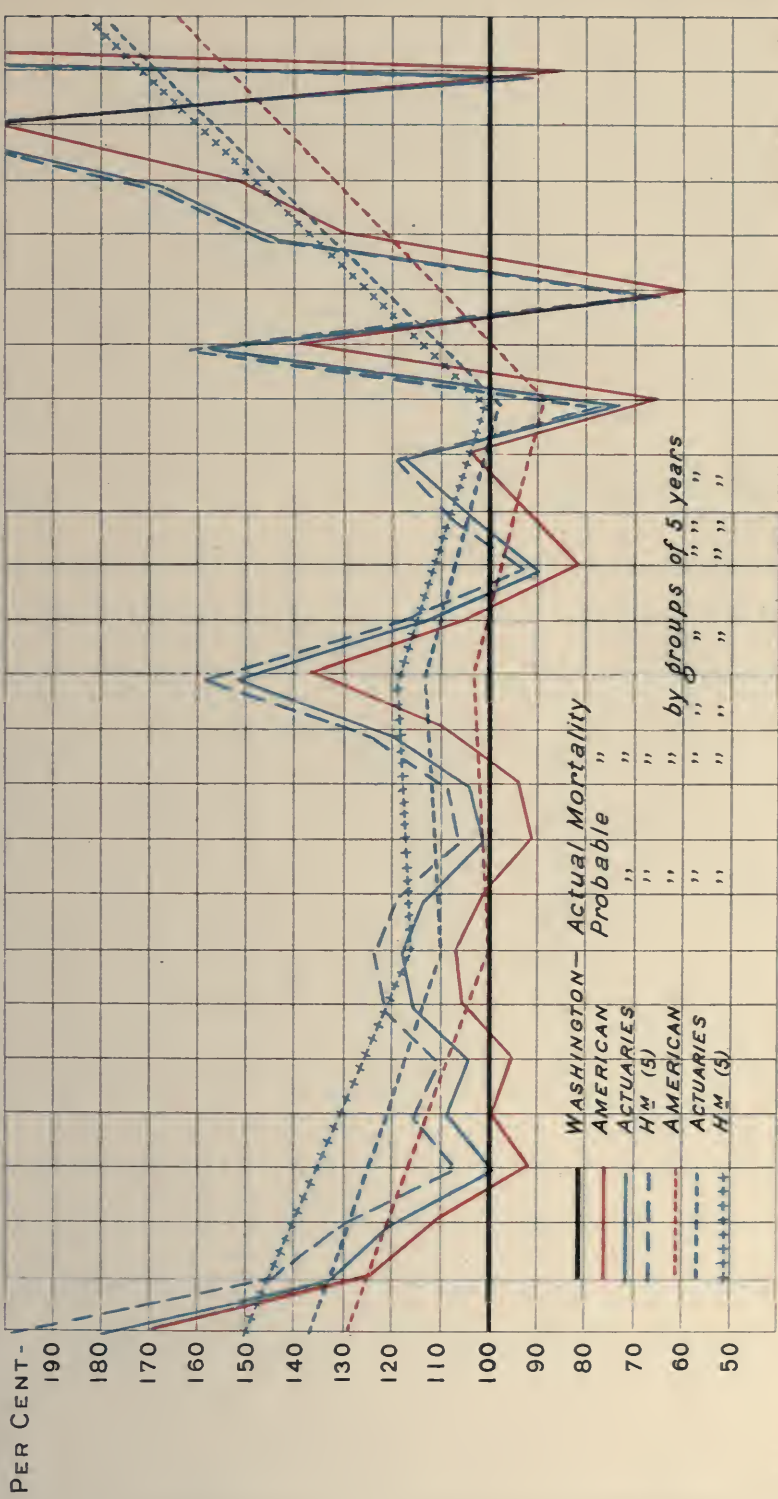
Diagram D is the counterpart of C in regard to the H^m (5) table of mortality.

The element of medical selection having been eliminated by leaving out the experience for the first five years of membership, this table may be considered as representing, quite truly, the rate of mortality on unselected healthy lives. The comparison also illustrates Table IV., and shows the actual mortality experience to have been much less than the probable mortality in the early years of membership, on account of medical selection.

The actual mortality line approaches the probable as the risks advance in years of membership.

88

COMPARISON OF THE ACTUAL MORTALITY OF THE WASHINGTON WITH THE PROBABLE MORTALITY BY H$\underline{M}$ (5) TABLE — BY EACH YEAR AND BY GROUPS OF FIVE YEARS OF MEMBERSHIP — SHOWING THE EFFECT OF MEDICAL SELECTION.

D

PER CENT—

H$\underline{M}$ (5) — Probable Mortality
WASHINGTON — Actual Mortality
" " " by Groups of 5 Years.

YEAR OF MEMBERSHIP
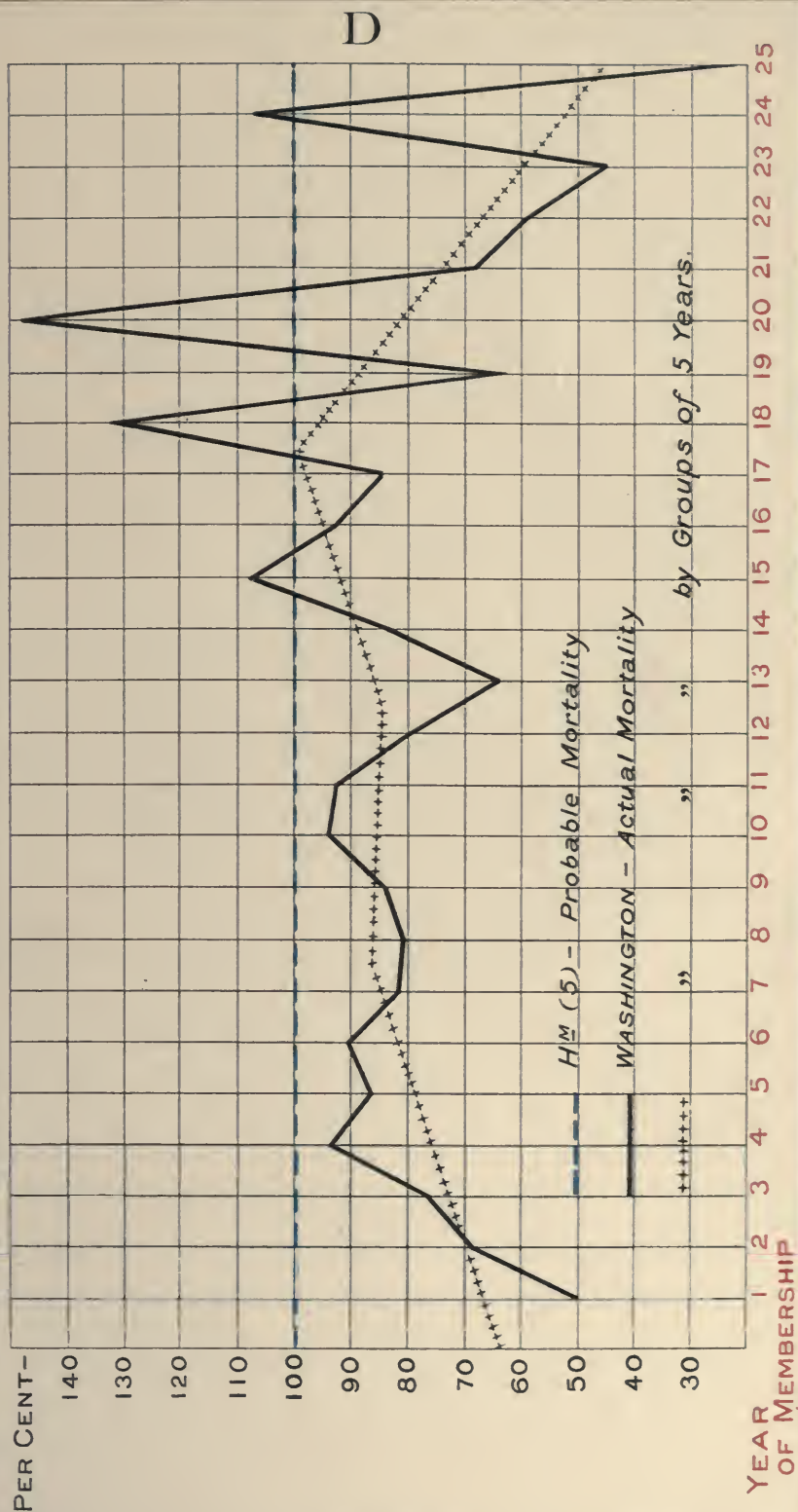
Diagram E exhibits the line of mortality through the successive ages from 10 to 85 on 100,000 lives at the starting point.

The *amounts* of insurance are the basis of the actual experience.

The broken black line illustrates Table VI. as graduated in Table VII.—a geometrical curve—and includes on the left the number surviving at each age. The other lines include respectively the number surviving at each age according to the several tables. The space at the right indicates the total number of the deaths up to and including each age.

90

E

DIAGRAM OF THE NUMBER SURVIVING AT EACH AGE
OUT OF 100 000 LIVING AT AGE 10,
BASED ON AMOUNTS OF INSURANCE.
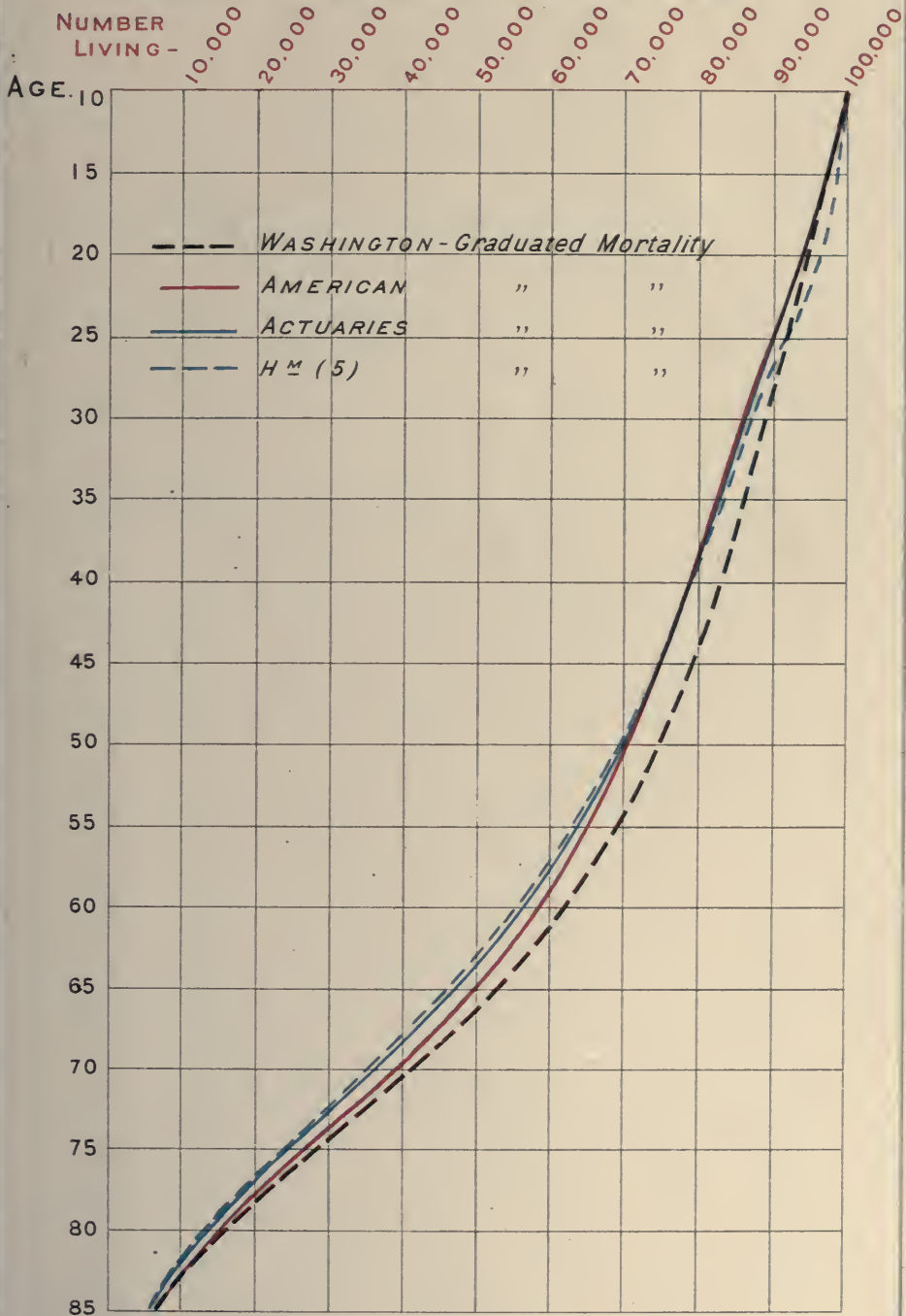
Diagram F exhibits the mortality rate by several tables as compared with the graduated actual mortality rate of the Washington.

By every diagram the lines exhibiting the experience of this company are well within the lines of the two standard tables, running quite parallel with, although much below, the results expected by the Actuaries' table, now the standard of valuation of the Insurance Department of this State.

92

COMPARISON OF THE MORTALITY RATE BY OTHER TABLES
WITH THE EXPERIENCE OF THE WASHINGTON.
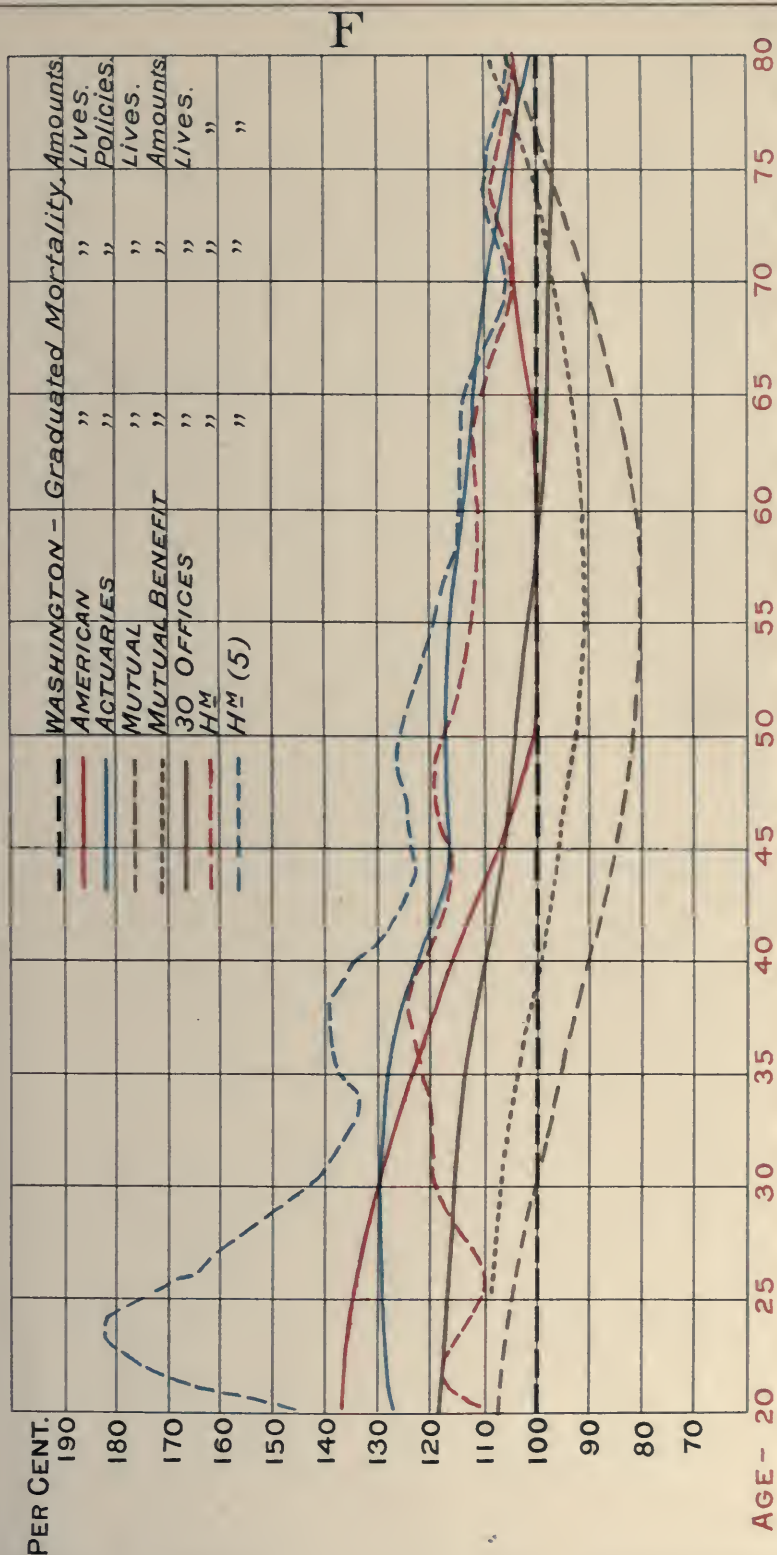
MEDICAL.

MEDICAL STATISTICS.

———

This report from the medical department covers the period from the foundation of the company in February, 1860, to April, 1886. The deaths of males only are considered, those of females, eighty-six in number, being too few for profitable analysis.

The work is divided into two parts. Part I. consists of ten general tables and three colored diagrams, with brief explanatory notes. Part II. is devoted to special studies of some of the more important causes of death, namely, Consumption, Cancer, and Diseases of the Nervous and Circulatory Systems.

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PART I.

GENERAL TABLES.

TABLE I.

GENERAL TABLE OF DISEASES AND NUMBERS DYING OF EACH DISEASE, ARRANGED IN CHRONOLOGICAL SERIES OF 500 CASES.

CAUSE OF DEATH.	Total 1860–'86.	I. 1860–'73.	II. 1873–'78.	III. 1878–'82.	IV. 1882–'86.
Total	2,000	500	500	500	500
I. ZYMOTIC DISEASES.					
Carbuncle	4		3	1	
Cholera	6	5	1		
Cholera Morbus	10	2	3	3	2
Diarrhœa	12	3	2	4	3
Diphtheria	4	1		1	2
Dysentery	14	5	2	5	2
Erysipelas	12	2	3	4	3
Fever	2	1	1		
Fever, cerebro-spinal	12	5	3	2	2
Fever, congestive	10	6	3	1	
Fever, intermittent	4	1	1		2
Fever, malarial	13		3	4	6
Fever, remittent	17	9	3	3	2
Fever, scarlet	1				1
Fever, typhoid	82	28	24	13	17
Fever, typho-malarial	14	3	2	7	2
Fever, typhus	5	2	2	1	
Fever, yellow	3		1	2	
Influenza	1			1	
Measles	1	1			
Pyæmia	7	1	1	2	3
Septicæmia	5		2	2	1
Small-pox	9	6	2		1
Total	248	81	62	56	49
Percentage	12.40	16.20	12.40	11.20	9.80

TABLE I.—*Continued.*

Cause of Death.	Total 1860-'86.	I. 1860-'73.	II. 1873-'78.	III. 1878-'82.	IV. 1882-'86.
II. Constitutional Diseases.					
Anæmia	4			2	2
Cancer	68	13	11	19	25
Consumption	353	109	108	68	68
Debility	7		1	5	1
Diabetes	12		5	1	6
Dropsy	4	2	1	1	
Gout	2	1		1	
Lumbar Abscess	5	3		1	1
Old age	6			2	4
Rheumatism	12	2	4	1	5
Tumors	2	1	1		
Tubercular Meningitis	2		1	1	
Total	477	131	132	102	112
Percentage	23.85	26.20	26.40	20.40	22.40
III. Diseases of Nervous System.					
Abscess of brain	3		1	1	1
Alcoholism	11		2	5	4
Apoplexy	88	26	24	18	20
Cerebral effusion	3		1		2
Cerebral embolism	3		1		2
Cerebral hemorrhage	11		2	4	5
Congestion of brain	27	6	8	11	2
Disease of brain	13	6	5		2
Encephalitis	10	5	3	1	1
Epilepsy	1			1	
General paresis of insane	7			4	3
Graves' disease	1				1
Insanity	7	2	2		3
Locomotor Ataxy	5	1		1	3
Meningitis	12	4	4	1	3
Nervous prostration	11	3	2	3	3
Paralysis	51	9	8	14	20
Sclerosis of brain	1		1		
Softening of brain	27	2	9	9	7
Sunstroke	5	1	1	3	
Tetanus	2	2			
Tuberculosis of brain	1		1		
Tumor of brain	1				1
Disease of spinal cord	3			1	2
Inflammation of spinal cord	2		1	1	
Sclerosis of spinal cord	2		1		1
Total	308	67	77	78	86
Percentage	15.40	13.40	15.40	15.60	17.20

TABLE I.—*Continued.*

Cause of Death.	Total 1860–'86.	I. 1860–'73.	II. 1873–'78.	III. 1878–'82.	IV. 1882–'86.
IV. Diseases of Circulatory System.					
Aneurism	2	1		1	
Angina pectoris . .	7	1	1	2	3
Atheroma of aorta . .	4		2	1	1
Disease of heart . .	38	10	9	8	11
Embolism of heart . .	1		1		
Endocarditis . . .	7	1		2	4
Fatty degeneration of heart	18		1	10	7
Gouty disease of heart .	1				1
Hypertrophy and dilatation of heart . . .	13	1	4	2	6
Neuralgia of heart .	1		1		
Ossification of coronary arteries	2			1	1
Paralysis of heart . .	5		1	3	1
Pericarditis . . .	4	2			2
Rheumatism of heart .	7	2	1	1	3
Rupture of heart . .	3			2	1
Rupture of blood-vessel in liver	2		1	1	
Valvular disease of heart .	38	2	7	16	13
Total . . .	153	20	29	50	54
Percentage . .	**7.65**	**4.00**	**5.80**	**10.00**	**10.80**
V. Diseases of Respiratory System.					
Abscess of lungs . .	2		1		1
Asthma	3				3
Bronchitis . . .	19	4	5	6	4
Congestion of lungs .	27	10	10	2	5
Disease of lungs . .	7	2	3	2	
Emphysema . . .	3	1		1	1
Empyema . . .	1			1	
Gangrene of lungs .	2				2
Hemorrhage of lungs .	12	5	3	3	1
Hydrothorax . .	1		1		
Laryngitis . . .	9	3	3	2	1
Œdema of lungs . .	4	1	1	2	
Pleurisy	8	5	1		2
Pneumonia . . .	183	39	45	56	43
Pulmonary Apoplexy .	3			2	1
Tonsillitis . . .	1				1
Total . . .	285	70	73	77	65
Percentage . .	**14.25**	**14.00**	**14.60**	**15.40**	**13.00**

TABLE I.—*Continued.*

Cause of Death.	Total 1860–'86.	I. 1860–'73.	II. 1873–'78.	III. 1878–'82.	IV. 1882–'86.
VI. Diseases of Digestive System.					
Stricture of œsophagus .	1	1			
Congestion of stomach .	5	2		1	2
Disease of stomach .	4		1	2	1
Dyspepsia . . .	4		1	1	2
Gastritis	26	7	4	12	3
Hemorrhage of stomach	2			2	
Tumor of stomach .	1		1		
Ulceration of stomach .	8	1	2	3	2
Gastro-enteritis .	12	4	2	2	4
Abscess of bowels .	2		1	1	
Fistula in ano . . .	1		1		
Hemorrhage of bowels .	2	1		1	
Hemorrhoids . . .	1		1		
Inflammation of bowels .	21	8	6	1	6
Obstruction of bowels .	2			1	1
Perforation of bowels .	3		1	1	1
Peritonitis . . .	19	6	3	4	6
Strangulated hernia .	2		1		1
Stricture of rectum .	2	1		1	
Ulceration of bowels .	1		1		
Abscess of liver . .	8	1	4		3
Biliary calculi . .	3	1		2	
Cirrhosis of liver .	32	4	6	12	10
Congestion of liver .	4	1	1	1	1
Disease of liver . .	11	1	5	4	1
Fatty degeneration of liver	1				1
Hypertrophy of liver .	5		1	4	
Inflammation of liver .	20	6	6	5	3
Jaundice	1	1			
Obstruction of hepatic duct	3		1		2
Ascites	3	2	1		
Disease of abdomen .	1	1			
Leucocythemia . .	3			3	
Tumor of abdomen .	3	2		1	
Total . . .	217	51	51	65	50
Percentage .	10.85	10.20	10.20	13.00	10.00

TABLE I.—*Continued.*

Cause of Death.	Total 1860–'86.	I. 1860–'73.	II. 1873–'78.	III. 1878–'82.	IV. 1882–'86.
VII. Diseases of Urinary System.					
Albuminuria . . .	1	1			
Abscess of kidneys .	1			1	
Bright's disease . .	71	11	19	14	27
Congestion of kidneys .	1			1	
Disease of kidneys . .	19	5	8	5	1
Nephritis . . .	12	1	2	4	5
Uræmia	3		1	1	1
Cystitis	10		1	7	2
Hemorrhage of bladder .	2	1			1
Disease of prostate .	3	1		1	1
Total . . .	123	20	31	34	38
Percentage ·	**6.15**	**4.00**	**6.20**	**6.80**	**7.60**
VIII. Accidents and Injuries.					
Burns	8	6	1	1	
Drowning . . .	25	6	5	9	5
Explosions . . .	3	1	2		
Exposure . . .	2	1	1		
Falls	25	5	8	4	8
Falling bodies . .	4	2		1	1
Gunshot wounds . .	8	6	1		1
Homicide . . .	4	2	1		1
Knife wounds . . .	3	1	2		
Lightning . . .	1	1			
Injuries by machinery .	9	2		4	3
Mining accidents . .	8		1	2	5
Railroad accidents . .	23	11	6	4	2
Other accidents . .	3	1	1		1
Total . . .	126	45	29	25	27
Percentage ·	**6.30**	**9.00**	**5.80**	**5.00**	**5.40**
IX. Suicides.					
Cutting throat . . .	10	2	3	1	4
Drowning . . .	3	1	2		
Hanging	9	1	2	2	4
Poison	5	3			2
Shooting	23	3	5	8	7
Total . . .	50	10	12	11	17
Percentage ·	**2.50**	**2.00**	**2.40**	**2.20**	**3.40**
X. Unclassified.					
Abscess	3	1	2		
Disease of joints . .	2	1		1	
Unknown . . .	8	3	2	1	2
Total . . .	13	5	4	2	2
Percentage · ·	**.65**	**1.00**	**.80**	**.40**	**.40**

TABLE I.

In this introductory table are tabulated all diseases which appear in the mortality records. In many cases the numbers are small, but, when the diseases are grouped into their respective classes, the resulting totals are sufficiently large to repay consideration.

The chronological arrangement enables us to see what difference there may be between the earlier and the later experience of the company. As it has grown older, the average age of its policy-holders has naturally increased. This does not imply that more elderly persons are insured now than formerly.* The age at issue may be the same at the present time as in the first year of existence of the company, but it must now be averaged with the increased age of the policies remaining in force from previous years. In 1864, the average age of eighteen hundred and seventy policy-holders was 37.16 years ; in 1884, twenty years later, the average age of fourteen thousand seven hundred and nine policy-holders was 42.98 years, a gain of nearly six years. This increase in age of those exposed will probably furnish a satisfactory explanation of the variation in the mortality experience throughout the series.

The general class of zymotic diseases includes two hundred and forty-eight deaths, or 12.40 per cent. of the total number. The percentage diminishes rapidly from 16.20 per cent. in the first series to 9.80 per cent. in the last series. This marked difference is probably partly due to the progress in sanitary science of recent years, but mainly to the more advanced age of those from whom the deaths are drawn in the later series. As will be shown in Tables II. and III., deaths from zymotic diseases, especially typhoid fever, are relatively rare among those of mature years. The lessened mortality holds good of all the diseases of this class with but two or three exceptions.

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* According to the actuarial records, 35.25 years was the average " office age " of all policies *issued* by the Washington Life Ins. Co. in 1864, and 33.81 years the average " office age " of all policies *issued* in 1884.

Class II.—constitutional diseases—caused four hundred and seventy-seven deaths, or 23.85 per cent. of the whole number. The diminished percentage in the later series is owing to the great falling off in the mortality from the principal disease of the group, i. e., consumption. In the first two series consumption was the cause of 21.70 per cent. of the deaths, as compared with 13.60 per cent. in the last two series. This great variation is undoubtedly due in large part to the more careful selection of risks of late years, and also to the greater average age of the last thousand cases, deaths from consumption being proportionately more frequent among the young than among the old.

The mortality from cancer increased from 2.60 per cent. in the first series to 5.00 per cent. in the last series. There are no deaths from old age until we reach the third series, which covers the period from 1878 to 1882.

Deaths from diseases of the nervous system were three hundred and eight, or 15.40 per cent. of the total mortality. As the principal diseases of this class are the result of the chronic changes of advancing years, we are not surprised to find their percentage increase steadily from 13.40 in the first to 17.20 in the last series.

Under the heading of diseases of the circulatory system are classed one hundred and fifty-three deaths, two-thirds of which are furnished by the last two series. Here again, age is the prime factor in the increased mortality.

Two hundred and eighty-five deaths are recorded under Class V.—diseases of the respiratory system. The number does not vary greatly throughout the series. One hundred and eighty-three, or almost two-thirds of the whole number in the class, are attributed to pneumonia.

The diseases of the digestive system caused two hundred and seventeen deaths, of which eighty-eight are classed under the various affections of the liver. The percentage is somewhat greater in the third series than in the others, but this difference is no doubt accidental.

Diseases of the urinary system show a steady increase of mortality from 4.00 per cent. in the first to 7.60 per cent. in the last series, and the increase is probably due to the same cause as the increase in the diseases of the nervous and circulatory systems.

Of the one hundred and twenty-six deaths by accident, the first series furnishes by far the largest proportion. This does not appear surprising when we consider that the young are less prudent than those of mature years, and are also more apt to be engaged in hazardous occupations.

There are fifty deaths from suicide, one-third of which are found in the last series. According to Tables II. and III., suicide is more frequent among the young than the old; hence, we should expect the percentage to diminish throughout the series rather than increase. There are reasons to fear that this increased mortality in the last few years is not simply accidental. Recent decisions of the courts have not been such as to discourage suicide among the holders of policies of life insurance.

TABLE II.—AGE AT ISSUE.

DISEASES GROUPED INTO SIXTEEN CLASSES, NUMBERS AND PERCENTAGES DYING IN EACH CLASS, ARRANGED ACCORDING TO AGE AT ISSUE OF POLICY. ALSO, AVERAGE AGE AT ISSUE IN EACH CLASS.

AGE AT ISSUE.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	2,000	87	161	68	353	56	224	84	153	183	102	88	129	123	126	50	13
General average percentage		4.35	8.05	3.40	17.65	2.80	11.20	4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	.65
12 to 29 years	397	29	35	4	118	4	24	17	16	29	22	14	16	15	42	11	1
Percentage	19.85	7.30	8.82	1.01	29.72	1.01	6.05	4.28	4.03	7.30	5.54	3.53	4.03	3.78	10.58	2.77	.25
30 to 39 years	681	37	69	16	140	17	51	36	34	62	30	34	48	36	42	22	7
Percentage	34.05	5.43	10.13	2.35	20.56	2.49	7.49	5.29	4.99	9.10	4.41	4.99	7.05	5.29	6.17	3.23	1.03
40 to 49 years	537	17	32	24	71	24	74	21	55	54	26	22	39	38	26	11	3
Percentage	26.85	3.17	5.96	4.47	13.22	4.47	13.78	3.91	10.24	10.06	4.84	4.10	7.26	7.07	4.84	2.05	.56
50 to 59 years	298	4	21	20	20	7	53	8	36	27	15	17	20	28	14	6	2
Percentage	14.90	1.34	7.05	6.71	6.71	2.35	17.79	2.68	12.08	9.06	5.03	5.71	6.71	9.40	4.70	2.01	.67
60 to 69 years	84		4	3	4	4	21	2	12	10	9	1	6	6	2		
Percentage	4.20		4.76	3.57	4.76	4.76	25.00	2.38	14.29	11.90	10.71	1.19	7.15	7.15	2.38		
70 to 71 years	3			1			1			1							
Percentage	.15			33.33			33.34			33.33							
Average Age at Issue of Total.	39.42 years.	33.72 years.	37.56 years.	45.38 years.	34.61 years.	42.59 years.	44.43 years.	37.73 years.	44.06 years.	40.61 years.	40.52 years.	39.50 years.	40.25 years.	42.28 years.	36.21 years.	36.32 years.	38.08 years.

TABLE II.

This table will aid us in estimating what diseases, at any given age of insurance, are most to be feared as a cause of death. The percentage of deaths by each disease for each period of age may be compared with the general average percentage of that disease.

There were three hundred and ninety-seven deaths of persons who insured under the age of 30 years. Typhoid fever, consumption, and accidents and injuries give a percentage much above their general average, the three classes together having caused 47.60 per cent. of the mortality, as compared with 28.30 per cent. for all ages. Deaths from cancer, apoplexy, heart disease and diseases of the kidney are comparatively few in number.

Six hundred and eighty-one deaths were from the second decennial period (30 to 39 years, inclusive). Typhoid fever and consumption show a large falling off in their relative mortality, though still above their general average. The percentage for accidents (6.17) is even somewhat less than the average for all ages. Deaths from suicide, on the other hand, show a decided increase in their number; zymotic diseases, other than typhoid fever, give the large percentage of 10.13; and diseases of the nervous system, not including apoplexy, caused a relatively high mortality. The remaining causes of death do not vary greatly from the general average percentage, with the exception of apoplexy and diseases of the heart, which still remain much below their average for all ages.

Period III. (40 to 49, inclusive) contributes five hundred and thirty-seven deaths. Apoplexy figures here as the principal cause of the mortality, being credited with 13.78 per cent. Consumption comes next with a percentage of 13.22, much below its general average of 17.65 per cent. Diseases of the heart show a very large

gain in this period, causing 10.24 per cent. of the mortality. Cancer, pneumonia and diseases of the kidneys also give a percentage above the average for all ages.

The mortality from Period IV. (50 to 59 years, inclusive) shows a steady progression of the tendencies developed in the previous period. Deaths from cancer, apoplexy, heart disease and diseases of the kidney form 45.98 per cent. of the whole number. Diseases of the liver caused 5.71 per cent. of the mortality for this period, the general average being 4.40 per cent. Consumption falls to a comparatively unimportant rank, its percentage being but 6.71.

Apoplexy, heart disease and diseases of the respiratory system, including pneumonia, caused 61.90 per cent. of the deaths from Period V. (60 to 69 years, inclusive). Typhoid fever does not appear at all, there are no deaths by suicide, only four from consumption, and two by accident. Cancer, diseases of the digestive system other than those of the liver, and diseases of the kidneys have a percentage somewhat higher than their general average.

Of the three deaths recorded from Period VI. (70 to 71), cancer, apoplexy, and pneumonia each claim one.

To recapitulate, typhoid fever, consumption and accidental injuries cause their greatest mortality among those insuring under 30 years of age, and the table shows their relative proportions rapidly and steadily diminishing as the age of insurance increases. Zymotic diseases, other than typhoid fever, and diseases of the nervous system, omitting apoplexy, have their highest percentage among the younger ages, but reach their maximum in the second decennial period. The same is true of deaths by suicide. Cancer, apoplexy, heart disease and diseases of the kidney, cause, relatively, few deaths in the earlier periods, but their percentage increases rapidly throughout the series.

In the table below, the ages at issue have been consolidated into two groups, the age of 40 years being taken as the dividing line. One thousand and seventy-eight cases, or 53.90 per cent. of the whole number, form the first group, and nine hundred and twenty-

two, or 46.10 per cent., the second. These percentages will serve as a standard for comparison with the relative percentage of the two groups for each disease.

Age at Issue.	Total.	Typhoid and Typhus.	Other Zymotic.	Cancer.	Consumption.	Other Constitutional.	Apoplexy.	Other Diseases of Nervous System.	Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Under 40 years.	1,078	66	104	20	258	21	75	53	50	91	52	48	64	51	84	33	8
Percentage.	53.90	75.86	64.60	29.41	73.09	37.50	33.43	63.10	32.68	49.73	50.98	54.55	49.61	41.46	66.67	66.00	61.54
40 years or over.	922	21	57	48	95	35	149	31	103	92	50	40	65	72	42	17	5
Percentage.	46.10	24.14	35.40	70.59	26.91	62.50	66.57	36.90	67.32	50.27	49.02	45.45	50.39	58.34	33.33	30.40	38.46

TABLE III.—AGE AT DEATH.

DISEASES CLASSIFIED. NUMBERS AND PERCENTAGES DYING IN EACH CLASS FOR EACH DECENNIAL PERIOD OF LIFE. ALSO, AVERAGE AGE AT DEATH IN EACH CLASS OF DISEASES.

AGE AT DEATH.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	2,000	87	161	68	353	56	224	84	153	183	102	88	129	123	126	50	13
General average percentage		4.35	8.05	3.40	17.65	2.80	11.20	4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	.65
19 to 29 years	139	18	10	1	44	1	9	3	2	9	7	1	6	3	21	4	
Percentage	6.95	12.95	7.19	.72	31.65	.72	6.47	2.16	1.44	6.47	5.04	.72	4.32	2.16	15.11	2.88	
30 to 39 years	413	27	41	5	116	6	18	18	17	33	23	16	23	16	35	14	5
Percentage	20.65	6.54	9.93	1.21	28.09	1.45	4.36	4.36	4.12	7.99	5.57	3.87	5.57	3.87	8.47	3.39	1.21
40 to 49 years	593	28	57	15	111	17	54	38	30	57	27	29	44	33	31	17	5
Percentage	29.65	4.72	9.61	2.53	18.72	2.87	9.11	6.41	5.06	9.61	4.55	4.89	7.42	5.56	5.23	2.87	.84
50 to 59 years	451	11	30	24	59	16	55	18	45	45	20	24	33	32	26	17	3
Percentage	22.55	2.44	6.65	5.32	13.08	3.55	12.20	3.99	9.98	9.98	4.43	5.32	7.32	7.10	5.76	2.22	.66
60 to 69 years	303	2	19	18	19	11	67	5	40	25	15	16	20	31	10	5	
Percentage	15.15	.66	6.27	5.94	6.27	3.63	22.12	1.65	13.20	8.25	4.95	5.28	6.60	10.23	3.30	1.65	
70 to 81 years	101	1	4	5	4	5	21	2	19	14	10	2	3	8	3		
Percentage	5.05	.99	3.96	4.95	3.96	4.95	20.79	1.98	18.82	13.86	9.90	1.98	2.97	7.92	2.97		
Average Age at Death of Total.	47.96 years.	39.97 years.	45.35 years.	54.94 years.	42.00 years.	53.05 years.	54.09 years.	46.13 years.	54.92 years.	49.19 years.	49.11 years.	49.12 years.	48.22 years.	52.64 years.	42.82 years.	43.98 years.	44.69 years.

TABLE III.

A careful study of this table will be found to confirm and emphasize the conclusions drawn from Table II.

Of one hundred and thirty-nine deaths under the age of 30 years, 59.71 per cent. were caused by typhoid fever, consumption and accidental injuries. Deaths from suicide are also relatively numerous. All other diseases give a mortality below the average.

In the second period of 30 to 39 years, inclusive, typhoid fever, consumption, and accidents still show a very high rate of mortality, though considerably less than in the preceding period. Zymotic diseases, other than typhoid fever, and suicides, attain here their highest percentage.

In Period III. (40 to 49), typhoid fever and consumption have fallen almost to their general average for all ages, and accidental injuries are considerably below their average percentage. Zymotic diseases, other than typhoid fever, still show a very high mortality ; pneumonia, whose percentage has been steadily increasing, now claims more than its average rate for all ages.

In the next period (50 to 59), cancer, apoplexy, heart disease and diseases of the kidney give a largely increased mortality. Pneumonia also shows a slight gain ; diseases of the liver attain their maximum percentage in this period. Deaths from typhoid fever and from consumption are relatively few in number.

In Period V. (60 to 69), deaths from cancer, apoplexy, heart disease and diseases of the kidney preponderate enormously, amounting to 51.49 per cent., or over one-half of the whole number. Diseases of the liver still give a high percentage ; typhoid fever, consumption and accidents taken together caused but 10.23 per cent. of the mortality, as compared with 59.71 per cent. in the first period.

In Period VI. (70 to 81), the figures for cancer, apoplexy and diseases of the kidney are somewhat less than in the preceding period, while the percentage for diseases of the heart shows a very

great increase.   Diseases of the respiratory system, including pneumonia, caused 23.76 per cent. of the deaths, their average for all ages being only 14.25 per cent.

Of the two thousand deaths, one thousand one hundred and forty-five, or 57.25 per cent., occurred under the age of 50 years, and eight hundred and fifty-five, or 42.75 per cent., at the age of 50 years or over that age.   In the following table the ages at death are consolidated into these two groups, with the relative percentage of each group for each disease.

Age at Death.	Total.	Typhoid and Typhus.	Other Zymotic.	Cancer.	Consumption.	Other Constitutional.	Apoplexy.	Other Diseases of Nervous System.	Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Under 50 years.	1,145	73	108	21	271	24	81	59	49	99	57	46	73	52	87	35	10
Percentage ..	57.25	83.91	67.08	30.88	76.77	42.86	36.16	70.24	32.03	54.10	55.88	52.27	56.59	42.28	69.05	70.00	76.92
50 years or over.	855	14	53	47	82	32	143	25	104	84	45	42	56	71	39	15	3
Percentage ..	42.75	16.09	32.92	69.12	23.23	57.14	63.84	29.76	67.97	45.90	44.12	47.73	43.41	57.72	30.95	30.00	23.08

Diagram A illustrates Table III.

DIAGRAM A.—Illus[...]

	Typhoid Fever.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, etc.
Total.	4.35	8.05	3.40	17.65	2.80	11.20
19 to 29 Years.	12.95	7.19	.72	31.65		
30 to 39 Years.	6.54	9.93	1.21	28.09		
40 to 49 Years.	4.72	9.61	2.53	18.72	2.87	9.11
50 to 59 Years	2.44	6.65	5.32	13.08	3.55	12.20
60 to 69 Years.	6.27	5.94	6.27	3.63	22.12	
70 to 81 Years	3.96	4.95	3.96	4.95	20.79	1.98

ating Table III. (AGE AT DEATH.)

Other Diseases of the Nervous System.	Diseases of the Heart.	Pneumonia.	Other Diseases of the Respiratory System.	Diseases of the Liver.	Other Diseases of the Digestive System.	Diseases of the Kidneys.	Accidents and Injuries.	Suicides.	Unclassified.
4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	
.72	6.47	2.16	6.47	5.04	.72	4.32	2.16	15.11	2.88
4.36	4.36	4.12	7.99	5.57	3.87	5.57	3.87	8.47	3.39	1.21
6.41	5.06	9.61	4.55	4.89	7.42	5.56	3.23	2.87	
9.98	9.98	4.43	5.32	7.32	7.10	5.76	2.21		
13.20	8.25	4.95	5.28	6.60	10.23	3.30	1.65		
18.82	13.86	9.90	1.98	2.97	7.92	2.97			

TABLE IV.

We hope to learn from this table the effect of the medical examination in controlling the mortality. There are some diseases, acute in character, which cannot be guarded against, and these diseases, among well-selected lives, should cause the bulk of the death-claims in the first year of insurance. Diseases peculiar to youth should also give a high mortality in the early periods.

One hundred and fifty-six deaths occurred in the first year of insurance. Of these, ninety-three, or 59.62 per cent. of the whole number, were caused by typhoid fever and other zymotic diseases, pneumonia, diseases of the digestive system (omitting those of the liver), and accidents and injuries. This is in accord with what has been stated above, these diseases being usually acute in character, and, with the exception of pneumonia and diseases of the digestive system, especially prevalent in the early years of life. The relative proportions for typhoid fever and other zymotic diseases, and accidents and injuries, also diminish steadily throughout the years of insurance, as they were seen to diminish throughout the periods of age at death (*vide* Table III.).

Consumption, on the other hand, which caused almost one-third of the deaths under 30 years of age, caused only 10.90 per cent. of the mortality in the first year of insurance, its general average being 17.65 per cent. This difference is probably mainly due to medical selection, but it must be borne in mind that consumption is usually a chronic disease, very seldom running its course in less than a year from the first appearance of marked symptoms. In the second year of insurance, the percentage for consumption mounts suddenly to 22.47, and reaches its highest figures in the third period—third to fifth years, inclusive. The effect of the medical examination would seem then to be exhausted after two or three years, the tendency of the disease to fatality in early life reasserting itself.

The mortality from apoplexy, diseases of the heart, and diseases of the kidney, increases uniformly with the years of insurance, the

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TABLE IV.—DEATHS DURING YEARS OF INSURANCE.

DISEASES CLASSIFIED. NUMBERS AND PERCENTAGES DYING IN EACH CLASS FOR EACH PERIOD OF INSURANCE. ALSO, AVERAGE DURATION OF INSURANCE IN EACH CLASS OF DISEASES.

DEATHS DURING YEAR OF INSURANCE.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	2,000	87	161	68	353	56	224	84	153	183	102	88	129	123	126	50	13
General average percentage		4.35	8.05	3.40	17.65	2.80	11.20	4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	.65
1st year	156	14	20	1	17	1	14	4	6	17	8	2	17	4	25	4	2
Percentage	7.80	8.97	12.83	.64	10.90	.64	8.97	2.56	3.85	10.90	5.13	1.28	10.90	2.56	16.03	2.56	1.28
2d year	178	12	18	5	40	5	19	8	11	13	7	4	10	6	17	2	1
Percentage	8.90	6.74	10.11	2.81	22.47	2.81	10.68	4.50	6.18	7.30	3.93	2.25	5.62	3.37	9.55	1.12	.56
3d to 5th yr. (inclusive)	455	24	36	20	110	12	38	22	20	37	24	19	26	21	26	18	2
Percentage	22.75	5.27	7.91	4.40	24.18	2.64	8.35	4.84	4.40	8.13	5.27	4.18	5.71	4.61	5.71	3.96	.44
6th to 10th yr. (inc.)	501	21	39	16	87	9	52	21	36	53	27	24	35	34	31	10	6
Percentage	25.05	4.19	7.78	3.19	17.36	1.80	10.38	4.19	7.19	10.58	5.39	4.79	6.99	6.79	6.19	1.99	1.20
Above 10 years	710	16	48	26	99	29	101	29	80	63	36	39	41	58	27	16	2
Percentage	35.50	2.25	6.76	3.66	13.94	4.09	14.23	4.09	11.27	8.87	5.07	5.49	5.78	8.17	3.80	2.25	.28
Average Duration of Policy of Total.	8.54 years.	6.25 years.	7.79 years.	9.56 years.	7.39 years.	10.46 years.	9.66 years.	8.40 years.	10.86 years.	8.58 years.	8.59 years.	9.62 years.	7.97 years.	10.36 years.	6.61 years.	7.66 years.	6.61 years.

DIAGRAM B.—Illustrati

Typhoid Fever.

Other Zymotic Diseases.

Cancer.

Consumption.

Other Constitu-tional Diseases.

Apoplexy, etc.

Total.	4.35	8.05	3.40	17.65	2.80	11.20
1st Year	8.97	12.83		10.90		8.97
2d Year.	6.74	10.11	2.81	22.47		28
3d to 5th Year.	5.27	7.91	4.40	24.18		2.64
6th to 10th Year.	4.19	7.78	3.19	17.36	1.80	10.38
Above 10 Years.	2.25	6.76	3.66	13.94	4.09	14.23

Table IV. (Deaths during Year of Insurance.)

Other Diseases of the Nervous System.	Diseases of the Heart.	Pneumonia.	Other Diseases of the Respiratory System.	Diseases of the Liver.	Other Diseases of the Digestive System.	Diseases of the Kidneys.	Accidents and Injuries.	Suicides.	Unclassified.
4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	
1.85	10.90	5.13	1.25	10.90	2.56	16.03		2.56	1.28
10.68	4.50	6.18	7.30	3.93	2.25	5.62	3.37	9.55	1.12
3.35	4.84	4.10	8.13	5.27	4.18	5.71	4.61	5.71	1.96
9	7.19	10.58	5.39	4.79	6.99	6.79	6.19	1.99	1.20
9	11.27	8.87	5.07	5.49	5.78	8.17	3.80	2.25	

percentage in the last period being very much above the general average in each of the three classes. There were four deaths from disease of the kidneys in the first year of insurance, and in no one of these cases had the urine been examined at the time of issue of the policy.

Apart from the effect of medical selection in determining the cause of death, its effect in lessening the general mortality should be considered. In the table we see the relative proportions of the two thousand deaths increasing from 7.80 per cent. in the first year of insurance, to 35.50 per cent. in the period above ten years of insurance. This record compares very favorably with that of the Mutual Life Insurance Company,* as well as with the figures given by Mr. Meech † in his report of the experience of thirty American companies. Of thirty-five thousand four hundred and forty-two deaths included in Mr. Meech's investigations, two thousand four hundred and forty-five took place in the first six months of insurance, which would imply at least double that number, or 13.80 per cent., for the whole year.

A comparative statement is given below of the respective percentages for the first year of insurance and the period above ten years of insurance :

Deaths during Years of Insurance.	First year.	Above 10 years.
Thirty American Companies . . .	13.80 %	14.91 %
Mutual Life Insurance Company . .	10.82 %	22.43 %
Washington Life Insurance Company .	7.80 %	35.50 %

Diagram B illustrates Table IV.

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* Mortality Experience of the Mutual Life Insurance Company of New York, published in 1875.

† System and Tables of Life Insurance, by Levi W. Meech.

TABLE V.—NATIVITY. CAUSES OF DEATH.

DISEASES CLASSIFIED. NUMBERS AND PERCENTAGES DYING IN EACH CLASS, ARRANGED ACCORDING TO NATIVITY. ALSO, RELATIVE PERCENTAGES OF NATIVE AND FOREIGN-BORN IN EACH CLASS OF DISEASES.

NATIVITY. CAUSES OF DEATH.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	2,000	87	161	68	353	56	224	84	153	183	102	88	129	123	126	50	13
General average percentage		4.35	8.05	3.40	17.65	2.80	11.20	4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	.65
United States	1,378	60	124	50	238	40	172	60	105	129	65	47	88	83	81	29	7
Percentage	68.90	4.35	9.00	3.63	17.28	2.90	12.48	4.35	7.62	9.36	4.72	3.41	6.39	6.02	5.88	2.10	.51
Germany	274	12	15	7	49	7	19	9	22	28	13	20	19	21	18	11	4
Percentage	13.70	4.38	5.47	2.56	17.88	2.56	6.93	3.28	8.03	10.22	4.75	7.30	6.93	7.66	6.57	4.02	1.46
Great Britain	118	3	11	5	14	2	7	9	8	11	11	9	8	7	8	3	2
Percentage	5.90	2.54	9.32	4.24	11.86	1.70	5.93	7.63	6.78	9.32	9.32	7.63	6.78	5.93	6.78	2.54	1.70
Ireland	84	4	4	3	20	2	9		8	5	3	5	7	8	5	1	
Percentage	4.20	4.76	4.76	3.57	23.81	2.38	10.72		9.53	5.95	3.57	5.95	8.33	9.53	5.95	1.19	
Canada	66	4	2	1	20	1	9	2	3	1	6	2	4	2	7	2	
Percentage	3.30	6.06	3.03	1.52	30.30	1.52	13.64	3.03	4.54	1.52	9.09	3.03	6.06	3.03	10.60	3.03	
Other Countries	80	4	5	2	12	4	8	4	7	9	4	5	3	2	7	4	
Percentage	4.00	5.00	6.25	2.50	15.00	5.00	10.00	5.00	8.75	11.25	5.00	6.25	3.75	2.50	8.75	5.00	
United States	1,378	60	124	50	238	40	172	60	105	129	65	47	88	83	81	29	7
Percentage	68.90	68.97	77.02	73.53	67.42	71.43	76.79	71.43	68.63	70.49	63.73	53.41	68.22	67.48	64.29	58.00	53.85
Foreign	622	27	37	18	115	16	52	24	48	54	37	41	41	40	45	21	6
Percentage	31.10	31.03	22.98	26.47	32.58	28.57	23.21	28.57	31.37	29.51	36.27	46.59	31.78	32.52	35.71	42.00	46.15

TABLE V.

Natives of the United States furnish one thousand three hundred and seventy-eight deaths ; natives of Germany come next with two hundred and seventy-four, leaving but three hundred and forty-eight for all other nationalities. The numbers are, consequently, too small in this latter case to form a basis for trustworthy conclusions. By grouping all the foreign-born together, and comparing the relative percentage of the native and foreign-born for each disease, the results become of more value.

With a few exceptions, nativity has had apparently but little influence in determining the cause of death. In most diseases the mortality of natives of the United States does not vary greatly from the general average for all nationalities. Zymotic diseases, cancer and apoplexy, however, caused a slight excess of deaths among natives, which is offset by a comparatively low mortality from respiratory diseases (except pneumonia), diseases of the liver, accidents, and suicides.

Consumption has its highest percentage among the natives of Canada, and its lowest among those of Great Britain.

Apoplexy caused relatively few deaths among the natives of Germany and of Great Britain.

Diseases of the liver show a marked variation from the general average percentage, having caused a mortality of only 3.41 per cent. among the native-born, while among all other nationalities, except Canadians, the rate of death is very high.

Accidents caused relatively a lower percentage of death among natives of the United States than among the foreign-born, probably because of the smaller number of the native-born engaged in hazardous occupations. Natives of Canada give the very high percentage of 10.60.

There were comparatively few deaths by suicide among the native-born, while of the foreign-born the Germans furnish the highest percentage for any single nationality.

DISEASES CLASSIFIED.   TABLE VI.—NATIVITY. DURATION OF POLICY.   DISEASES ARRANGED

DURATION OF INSURANCE BEFORE DEATH IN EACH CLASS OF DISEASES ARRANGED ACCORDING TO NATIVITY.

Nativity. Duration of Policy.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	8.54	6.25	7.79	9.56	7.39	10.46	9.66	8.40	10.86	8.58	8.59	9.62	7.97	10.36	6.61	7.66	6.61
United States	8.77	6.67	7.68	10.40	7.40	10.55	10.32	8.40	11.11	8.53	8.77	9.74	8.21	10.22	7.24	8.79	6.00
Germany	8.22	6.58	7.73	10.00	7.41	10.29	5.79	7.56	9.23	9.82	7.92	10.80	6.74	10.95	7.06	6.36	5.50
Great Britain	8.53	7.00	8.18	5.20	9.14	3.00	10.29	10.78	11.12	7.91	8.73	7.56	8.75	11.29	4.00	8.00	11.00
Ireland	8.56	4.00	12.75	5.67	7.60	14.50	8.11		10.87	6.80	13.33	6.20	10.00	9.25	8.20	4.00	
Canada	6.26	4.50	7.00	4.00	6.55	6.00	7.22	8.00	7.33	3.00	6.00	12.00	6.00	9.00	3.29	4.50	
Other Countries	7.42	2.25	6.20	6.50	5.92	12.75	8.75	5.25	13.43	7.78	7.75	10.00	5.00	12.50	3.14	5.25	
United States	8.77	6.67	7.68	10.40	7.40	10.55	10.32	8.40	11.11	8.53	8.77	9.74	8.21	10.22	7.24	8.79	6.00
Foreign	8.02	5.29	8.16	7.22	7.35	10.25	7.50	8.42	10.31	8.68	8.27	9.49	7.49	10.65	5.45	6.09	7.33

(All values expressed in years.)

TABLE VI.

We have seen that nativity exercises but little influence in determining the *cause* of death. There seems, however, to be considerable difference between the different nationalities in respect to the duration of insurance before death.

Natives of the United States give a general duration of policy of 8.77 years as compared with 8.02 years for the foreign-born, a difference of three-quarters of a year.

Of the foreign-born, the natives of Ireland have the best record, followed closely by the natives of Great Britain. The Germans come next, and the natives of Canada are last, their average duration of insurance being but 6.26 years, two and one-half years less than the figures for the natives of the United States.

The high average for the native-born is maintained throughout the various causes of death, with the exception of zymotic diseases, pneumonia, and diseases of the kidneys, in which classes the percentage is somewhat below the general average for all nationalities. The greatest difference in duration of insurance between the native and foreign-born is found in the classes of cancer, apoplexy, and suicides, the difference in favor of the native-born being 3.18 years, 2.82 years, and 2.70 years in the three classes respectively.

The natives of Germany show the most noteworthy variation from the general average duration of insurance in the class of apoplexy, the duration being only 5.79 years, as compared with 9.66 years for all nationalities.

The natives of Great Britain, as well as the natives of Ireland, correspond pretty closely with the general average, except in classes including only a limited number of deaths.

The natives of Canada continue their low average duration throughout the table, excepting in the class of diseases of the liver, in which there were but two cases.

The following supplementary table shows that the native-born attained a longer duration of insurance before death, in spite of the

fact that their average age at the time of insurance was 1.39 years greater than that of the foreign-born, therefore calling for a shorter "expectation of life." On comparing this probable expectation with the actual duration of insurance in each case, we find that natives of the United States reached 31.00 per cent. and foreigners only 27.38 per cent. of their expectation of life respectively.

*TABLE VI.—a.

UNITED STATES.	Typhoid and Typhus.	Other Zymotic.	Cancer.	Consumption.	Other Constitutional.	Apoplexy.	Other Diseases of Nervous System.	Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.	
	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.	Y'rs.
Average age at issue	39.85	33.70	37.65	45.98	34.49	42.50	45.34	38.58	44.63	40.91	40.91	38.98	40.44	42.88	36.99	36.83	38.57
Average age at death	48.62	40.37	45.33	56.38	41.89	53.05	55.66	46.98	55.74	49.44	49.68	48.72	48.65	53.10	44.23	45.62	44.57
Average duration of insurance . .	8.77	6.67	7.68	10.40	7.40	10.55	10.32	8.40	11.11	8.53	8.77	9.74	8.21	10.22	7.24	8.79	6.00
FOREIGN.																	
Average age at issue	38.46	33.78	37.27	43.72	34.88	42.81	41.42	35.58	42.81	39.91	39.84	40.10	39.83	41.05	34.82	35.62	37.50
Average age at death	46.48	39.07	45.43	50.94	42.23	53.06	48.92	44.00	53.12	48.59	48.11	49.59	47.32	51.70	40.27	41.71	44.83
Average duration of insurance . .	8.02	5.29	8.16	7.22	7.35	10.25	7.50	8.42	10.31	8.68	8.27	9.49	7.49	10.65	5.45	6.09	7.35

* As these figures are based on mortality statistics, and have no reference to the living, it does not follow that foreigners insure generally at an earlier age than natives of the United States. In fact, it appears that the average age at insurance is somewhat greater among the foreign-born than among the native-born. The applications of 5,000 foreigners, taken from the books of the company, show an average age at issue of 34.11 years, while the applications of 10,000 natives of the United States give an average age of only 33.73 years.

TABLE VII.

New England gives us a very high mortality from cancer, apoplexy, diseases of the heart, and diseases of the kidneys, and a very low mortality from zymotic diseases, diseases of the liver, and accidents. The percentage of death from consumption is somewhat below the average for the total number.

New York furnishes a comparatively large number of deaths from diseases of the liver and diseases of the kidneys. Apoplexy and diseases of the heart are also somewhat above the general average rate. Typhoid fever and other zymotic diseases, consumption, accidents, and suicides are all considerably below the average for the whole country.

New Jersey and Pennsylvania follow very closely the general average percentage, the slight excess for consumption being offset by the low rate for pneumonia and other acute diseases of the respiratory system.

The most striking variation in the Southern States, from the general average, is the low mortality from typhoid fever, contrasted with the very high mortality from other zymotic diseases. Diseases of the liver give a very large percentage, and diseases of the kidneys an extremely small one.

Ohio, Indiana, and Illinois furnish a rather high death-rate from zymotic diseases, including typhoid fever. Pneumonia and other diseases of the respiratory system caused 21.12 per cent. of the mortality, the general average being only 14.25 per cent. There were very few deaths from diseases of the kidneys.

In the Northwestern States the mortality from zymotic disease, including typhoid fever, is very great. Accidents, as well as suicides, give a very high percentage, the figures in both cases being much higher than in any other section of the country. Apoplexy caused very few deaths.

Section VII. includes so few deaths that the variations from the general average are probably in most cases simply accidental. Of

TABLE VII.—RESIDENCE AT DEATH. CAUSES OF DEATH.

DISEASES CLASSIFIED. NUMBERS AND PERCENTAGES DYING IN EACH CLASS, ARRANGED ACCORDING TO RESIDENCE AT DEATH.

Residence at Death. Causes of Death.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	2,000	87	161	68	353	56	224	84	153	183	102	88	129	123	126	50	13
General average percentage		4.35	8.05	3.40	17.65	2.80	11.20	4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	.65
I. New England	181	7	8	11	31	6	29	10	15	19	5	5	10	16	5	4	
Percentage	9.05	3.87	4.42	6.08	17.13	3.32	16.02	5.52	8.29	10.50	2.76	2.76	5.52	8.84	2.76	2.21	
II. New York	494	18	30	15	74	15	66	25	40	47	23	30	33	44	23	6	5
Percentage	24.70	3.64	6.07	3.04	14.98	3.04	13.36	5.06	8.10	9.51	4.66	6.07	6.68	8.91	4.66	1.21	1.01
III. N. J. and Pa.	357	14	30	13	71	9	42	13	28	24	12	17	22	25	26	10	1
Percentage	17.85	3.92	8.40	3.64	19.89	2.52	11.77	3.64	7.85	6.72	3.37	4.76	6.16	7.00	7.28	2.80	.28
IV. Southern States	197	3	30	7	33	7	20	9	12	15	14	12	13	5	10	6	1
Percentage	9.85	1.52	15.23	3.55	16.74	3.55	10.15	4.57	6.09	7.62	7.11	6.09	6.60	2.54	5.08	3.05	.51
V. O., Ind., and Ills.	303	18	26	9	49	7	32	15	19	40	24	7	24	7	17	6	3
Percentage	15.15	5.94	8.58	2.97	16.17	2.31	10.57	4.95	6.27	13.20	7.92	2.31	7.92	2.31	5.61	1.98	.99
VI. N. W. States (inc. Kan., Neb., and Dak.)	358	23	31	10	70	9	23	8	23	29	20	14	25	21	36	15	1
Percentage	17.90	6.42	8.66	2.80	19.55	2.51	6.42	2.24	6.42	8.10	5.59	3.91	6.98	5.87	10.06	4.19	.28
VII. Other West.S. and Ter. (Rocky Mt.Plat. and Pac.Sl.)	62	2	3	2	18	2	5	2	8	7	2	2		1	5	2	1
Percentage	3.10	3.23	4.84	3.23	29.02	3.23	8.06	3.23	12.90	11.29	3.23	3.23		1.61	8.06	3.23	1.61
VIII. Foreign	48	2	3	1	7	1	7	2	8	2	2	1	2	4	4	1	1
Percentage	2.40	4.17	6.25	2.03	14.58	2.08	14.58	4.17	16.68	4.17	4.17	2.08	4.17	8.33	8.33	2.08	2.08

the eighteen persons who died of consumption not one was born in this section, and only four resided there at time of issue of policy.

The deaths in foreign countries are even fewer in number than those in the previous section, and do not call for any extended comment.

Such variations from the average death-rate as have just been noted in the different divisions of the country cannot be attributed entirely to local causes. Differences in age at insurance, nativity, and occupation, if very marked, must have some influence in modifying the relative proportions as given in Table VII. Of these three factors, the age at insurance is probably the most important.

TABLE VII.—*a.*

RESIDENCE AT DEATH.	Average Age at Insurance.	NATIVITY.	
		United States.	Foreign.
Total	39.42 years.	68.90 %	31.10 %
I. New England . .	41.39 years.	86.74 %	13.26 %
II. New York . . .	40.54 years.	68.62 %	31.38 %
III. N. J. & Pa. . . .	40.98 years.	76.75 %	23.25 %
IV. Southern States . .	39.92 years.	75.63 %	24.37 %
V. Ohio, Indiana and Illinois	39.22 years.	66.34 %	33.66 %
VI. Northwestern States .	36.18 years.	56.15 %	43.85 %
VII. Other Western States ..	35.06 years.	67.74 %	32.26 %
VIII. Foreign Countries .	37.75 years.	31.25 %	68.75 %

In the above table New England gives the greatest average age at insurance, and its relative percentage of native-born is also by far the highest. We have here a two-fold cause for the excessive mortality from cancer and apoplexy, and the influence of advanced age in increasing the percentage of death from heart disease and disease of the kidneys is only partially neutralized by the relatively

low fatality of these diseases among the native-born (*v.* Tables II. and V.). The low mortality from zymotic disease again shows that the influence of age is more powerful than that of nationality.

The few deaths from diseases of the liver accord with the small percentage of foreign-born (Table V.).

Age and nativity unite in lowering the percentage of death from accident.

The moderate mortality from consumption, in spite of the trying climate of this section, is probably directly due to the advanced age at insurance and the large proportion of native-born.

The tables for occupations have not yet been considered, but the following cross-table gives the percentage of the principal occupations in each section of the country and in the country at large.

TABLE VII.—*b.*

RESIDENCE AT DEATH.	OCCUPATIONS.								
	Merchant.	Hazardous and Unhealthy.	Clerks.	Mechanics.	Shopk'p'rs.	Farmers.	Hotelk'p'rs.	Brokers.	Professions.
General Average Percentage.	29.65	12.90	9.35	9.15	7.90	7.85	5.50	5.20	12.50
New England. Percentage.	41.44	10.50	6.63	14.92	6.63	1.66	2.76	6.07	9.39
New York. "	35.83	9.11	9.72	6.27	8.50	6.07	5.87	5.67	12.96
N. J. and Pa. "	32.49	13.45	9.53	8.13	11.76	5.04	4.20	4.20	11.20
Southern States. "	31.98	12.18	10.15	2.54	6.09	8.63	5.59	8.63	14.21
Ohio, Ind., and Ills. "	27.06	10.56	8.25	12.54	6.94	14.85	6.27	4.29	9.24
Northwestern States. "	15.64	18.71	9.77	13.68	7.26	8.69	7.26	3.35	15.64
Other Western States. "	12.90	17.74	16.13	6.45	1.61	14.52	4.84	6.45	19.36
Foreign Countries. "	33.34	25.00	6.25	.....	4.17	8.33	4.17	8.33	10.41

Continuing our study of the deaths in New England, we note in this table that the class of merchants furnishes 41.44 per cent. of the mortality in this section, the proportion for all other occupations except that of mechanics being considerably below the average

DIAGRAM C.—Illustr

	Typhoid Fever.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, etc.
Total.	4.35	8.05	3.40	17.65	2.80	11.20
I. New England.	3.87	4.42	6.08	17.13	3.32	16.02
II. New York.	3.64	6.07	3.04	14.98	3.04	13.36
III. New Jersey and Pennsylvania.	3.92	8.40	3.64	19.89	2.52	11.7
IV. Southern States.	1.52	15.23	3.55	16.74	3.55	
V. Ohio, Indiana, and Illinois.	5.94	8.58	2.97	16.17	2.31	10.57
VI. N. W States. (Incl. Kan., Neb., and Dak.)	6.42	8.66	2.80	19.55	2.51	6.42
VII. Other Western States and Ter. (Rocky Mt. Plateau and Pac. Slope)	3.23	4.84	3.23	29.02		3.23

Other Diseases of the Nervous System.	Diseases of the Heart.	Pneumonia.	Other Diseases of the Respiratory System.	Diseases of the Liver.	Other Diseases of the Digestive System.	Diseases of the Kidneys.	Accidents and Injuries.	Suicides.	Unclassified.
4.20	7.05	9.15	5.10	4.40	6.45	6.15	6.30	2.50	
	5.52	8.29	10.50	2.76	2.76	5.52	8.84	2.76	2.21
5.1	8.10	9.51	4.66	6.07	6.68	8.91	4.66	1.21	1.0
	3.64	7.85	6.72	3.37	4.76	6.16	7.00	7.28	2.80
4.1	4.57	6.09	7.62	7.11	6.09	6.60	2.54	5.08	3.05
4.95	6.27	13.20		7.92	2.31	7.92	2.31	5.61	1.98
	6.12	8.10	5.59	3.91	6.98	5.87	10.06	4.19	
6	3.23	12.90	11.29	3.23	3.23	1.61	8.06	3.23	

for the whole country. Further, by referring to Table IX., it will be seen that the mortality among merchants coincides very nearly with the mortality as we have just described it in New England, and it would seem reasonable to consider occupation as second only to age in its influence upon the causes of death.

With the exception of the Northwestern States, the variations in age at insurance, nativity and occupation are not so marked throughout the other divisions of the country as in New England, hence the results are not so uniform. In the Northwestern States, the conditions are the very reverse of those in New England, and the effect is evident in the mortality. The average age at insurance is very low, the percentage of foreign-born is very high, and the proportion of merchants is extremely small, other occupations, especially those of a hazardous or unhealthy character, furnishing the bulk of the mortality. In consequence, we find that the percentage of deaths from cancer, apoplexy, heart disease, and disease of the kidneys is, without a single exception, below the average, while typhoid fever and other zymotic diseases, consumption, accidents, and suicides caused 48.88 per cent. of the deaths, the percentage from the same diseases in New England being only 30.39.

The accompanying diagram C illustrates Table VII., the deaths in foreign countries being omitted.

TABLE VIII.—RESIDENCE AT DEATH. DURATION OF POLICY. DURATION OF INSURANCE BEFORE DEATH IN EACH CLASS OF DISEASE, ARRANGED ACCORDING TO RESIDENCE AT DEATH.

DISEASES CLASSIFIED.

Residence at Death. Duration of Policy.	Total	Typhoid and Typhus Fevers	Other Zymotic Diseases	Cancer	Consumption	Other Constitutional Diseases	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System	Diseases of Heart and Other Diseases of Circulatory System	Pneumonia	Other Diseases of Respiratory System	Diseases of Liver	Other Diseases of Digestive System	Diseases of Kidneys and Other Diseases of Urinary System	Accidents and Injuries	Suicides	Unclassified
Total	8.54	6.25	7.79	9.56	7.39	10.46	9.66	8.40	10.86	8.58	8.59	9.62	7.97	10.36	6.61	7.66	6.61
I. New England	9.01	5.86	10.25	10.09	7.74	10.83	9.76	7.80	9.20	10.00	4.80	8.80	9.00	11.06	6.80	8.50	
II. New York	9.77	7.56	10.73	12.93	7.81	9.80	10.86	9.00	12.17	9.09	10.74	10.77	7.79	11.11	9.04	7.00	5.40
III. New Jersey and Pennsylvania.	9.62	6.57	7.33	8.92	8.97	14.67	9.19	9.54	12.29	11.54	11.50	9.24	9.82	11.64	7.62	9.90	7.00
IV. Southern States	6.86	4.67	6.17	9.57	5.82	11.29	5.40	5.67	10.58	8.93	4.86	8.25	6.00	6.40	6.20	7.50	10.00
V. Ohio, Indiana, and Illinois.	7.61	7.39	6.04	7.56	6.12	5.71	10.69	9.47	10.63	6.42	9.08	8.43	7.83	7.43	6.06	5.17	4.33
VI. N. W. States (inc. Kansas, Nebraska, and Dakota).	7.07	4.48	6.87	6.00	6.67	9.00	10.04	7.12	8.35	7.14	7.10	9.36	7.28	8.62	4.58	7.53	6.00
VII. Other West S. and Ter. (Rocky Mt. Plateau and Pac. Slope.)	7.89	7.00	11.00	13.50	6.44	9.50	5.00	8.50	11.25	6.86	11.00	15.50		1.00	4.20	8.50	8.00
VIII. Foreign Countries.	10.46	5.00	14.33	7.00	10.86	23.00	10.29	6.00	10.25	15.00	8.50	3.00	9.00	12.75	10.25	2.00	15.00

(All values expressed in years.)

TABLE VIII.

The general average duration of policy being 8.54 years, New York shows the most favorable experience with 9.77 years duration, followed closely by New Jersey and Pennsylvania with 9.62 years. New England is third with a duration of 9.01 years. All other sections of the country give a duration much less than the average, the Southern States coming last with an average length of policy of only 6.86 years. As was stated under Table VII., the deaths in foreign countries are too few in number to repay consideration.

New York maintains its high average throughout the various causes of death, with but three exceptions, in which the figures are slightly less than those for the total mortality. The same may be said of New Jersey and Pennsylvania. This fact would seem to show that the high average duration of the policies in these sections is due, not so much to immunity from those diseases which cause their heaviest mortality in the early years of insurance, but to the general excellence of the risks, considered from all standpoints. In New Jersey and Pennsylvania, in fact, as was seen in Table VII., the mortality from such causes as consumption and accident was even above the general average percentage.

New England, also, though not ranking as high as the above-mentioned sections, gives figures above the average duration in two-thirds of the causes of death.

On the other hand, the short duration of policy in the Southern States persists throughout twelve of the fifteen classified causes of death, being very striking in the mortality from apoplexy, in which the average length of insurance was only 5.40 years. As a large majority of those dying in this section were native-born (*v.* Table VII.—*a*), and the relative percentage for hazardous and unhealthy occupations was not above the average for the whole country (*v.* Table VII.—*b*), neither nationality nor occupation can be considered a factor in this unfavorable experience.

The Northwestern States, whose experience is only slightly more

favorable than that of the Southern States, rate below the average in all but one of the causes of death. According to Table VII.—*a*, 43.85 per cent. of those dying in this section were foreign-born, and it may here be added that of these foreign-born 21.66 per cent. were Canadians. We have already seen in Table VI. that the foreign-born generally average a shorter length of insurance before death than the native-born, and that natives of Canada show an especially unfavorable experience in this regard. Again, according to Table VII.—*b*, 18.71 per cent. of those dying in this region were engaged in occupations involving more than ordinary risk or exposure, so that this unfavorable factor is to be added to that of foreign birth in searching for the causes of the short duration of insurance. The duration of insurance in Sections V. and VII., though somewhat less than the average for the whole country, does not call for especial comment.

In Table VIII., the actual duration of policy before death has been employed as a standard of comparison in studying the effect of a given residence upon the length of insurance. But, as we have seen in Table VII.—*a*, the age at insurance varies considerably in the different sections of the country, and the expectation of life should vary correspondingly. If, now, we rate the various sections according to the percentage of expectation attained in each, we have the following table :

TABLE VIII.—*a.*

Residence at Death.	Percentage of Expectation of Life Attained.	
Total	29.86 %	
New England	33.16 %	
New York	35.16 %	Group I.
New Jersey and Pennsylvania .	35.03 %	
Southern States	24.29 %	
Ohio, Indiana, and Illinois .	26.48 %	
Northwestern States . . .	22.85 %	Group II.
Other Western States and Territories	24.86 %	

In this table, as in Table VIII., the different sections of the United States fall naturally into two groups, the first containing New England, New York, New Jersey, and Pennsylvania, and the second including all other States and Territories. The States in Group I. attained approximately one-third of their expectation of life, and those in Group II. only one-quarter.

New England compares more favorably with the other sections in its group than it did in Table VIII., though it still ranks below them. Ohio, Indiana, and Illinois now lead Group II., and the Northwestern States fall to the lowest place.

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TABLE IX.—OCCUPATIONS.   CAUSES OF DEATH.

DISEASES CLASSIFIED.   NUMBERS AND PERCENTAGES DYING IN EACH CLASS, ARRANGED ACCORDING TO OCCUPATION.

OCCUPATIONS. CAUSES OF DEATH.	Total.	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
Total	2,000	87	161	68	353	56	224	84	153	183	102	88	129	123	126	50	13
General average percentage		4.35	8.05	3.40	17.65	2.80	11.20	4.20	7.65	9.15	5.10	4.40	6.45	6.15	6.30	2.50	.65
Merchants	593	16	44	18	86	27	96	21	53	49	34	26	41	40	20	18	4
Percentage	29.65	2.70	7.42	3.04	14.50	4.55	16.19	3.54	8.94	8.26	5.73	4.38	6.91	6.75	3.37	3.04	.68
Hazardous and unhealthy	258	12	20	10	52	3	20	12	16	15	9	11	13	11	46	5	3
Percentage	12.90	4.65	7.75	3.88	20.16	1.16	7.75	4.65	6.20	5.82	3.49	4.26	5.04	4.26	17.83	1.94	1.16
Clerks	187	9	16	2	60	5	11	10	13	23	3	3	7	11	9	5	
Percentage	9.35	4.81	8.56	1.07	32.09	2.67	5.88	5.35	6.95	12.30	1.61	1.61	3.74	5.88	4.81	2.67	
Mechanics	183	13	16	6	35	2	13	6	10	16	13	6	16	10	16	5	
Percentage	9.15	7.11	8.74	3.28	19.13	1.09	7.11	3.28	5.46	8.74	7.11	3.28	8.74	5.46	8.74	2.73	
Shopkeepers	158	9	13	5	31	3	9	7	19	11	8	5	14	14	4	3	3
Percentage	7.90	5.70	8.23	3.16	19.62	1.90	5.70	4.43	12.03	6.96	5.06	3.16	8.86	8.86	2.53	1.90	1.90
Farmers	157	9	14	5	16	4	20	4	12	23	12	3	10	9	13	3	
Percentage	7.85	5.73	8.92	3.19	10.19	2.55	12.74	2.55	7.64	14.65	7.64	1.91	6.37	5.73	8.28	1.91	
Hotel-keepers	110	2	5	2	16	3	14	8	5	12	3	19	5	6	7	3	
Percentage	5.50	1.82	4.55	1.82	14.54	2.73	12.73	7.27	4.55	10.90	2.73	17.27	4.55	5.45	6.36	2.73	
Brokers	104	5	9	7	13	1	23	4	8	3	7	3	4	7	3	5	2
Percentage	5.20	4.81	8.65	6.73	12.50	.96	22.12	3.85	7.69	2.88	6.73	2.88	3.85	6.73	2.88	4.81	1.93
Physicians	68	3	4	7	10	3	5	4	3	7	2	4	7	6	2	1	
Percentage	3.40	4.41	5.88	10.29	14.72	4.41	7.35	5.88	4.41	10.29	2.94	5.88	10.29	8.83	2.94	1.48	
Lawyers	68	4	4	2	10	2	5	3	5	12	4	4	6	3	3	1	
Percentage	3.40	5.88	5.88	2.94	14.71	2.94	7.35	4.41	7.35	17.65	5.88	5.88	8.83	4.41	4.41	1.48	
Clergymen	54	3	7	2	10	2	2	3	4	7	3	4	2	3	2	1	
Percentage	2.70	5.56	12.96	3.70	18.52	3.70	3.70	5.56	7.41	12.96	5.56	7.41	3.70	5.56	3.70	1.67	
Other Professions	60	2	9		14	1	6	2	5	5	4		4	3	1		1
Percentage	3.00	3.33	15.00	3.33	23.33	1.67	10.00	3.33	8.33	8.33	6.67		6.67	5.00	1.67		1.67

TABLE IX.

The table shows the twelve classes into which the two thousand cases have been divided according to occupation. Any such grouping must be to a certain extent arbitrary, and there is, no doubt, room for question as to the success of the plan followed in this case. The names of the classes, as a rule, explain themselves.

Class I. includes 419 merchants, 83 manufacturers, 57 bankers and officers of corporations, 18 civil officials, and 16 individuals without occupation or retired from business. This class gives a relatively low death-rate from typhoid fever, consumption and accidents, whereas the mortality from apoplexy, disease of the heart, and diseases of the kidneys is above the average. The advanced age at insurance (42.32 yrs.) of members of this class is probably the main factor in determining the cause of death.

Class II. is composed of 13 bakers, 6 barbers, 15 commercial travelers, 11 foundrymen, 24 laborers, 11 lumbermen, 20 mariners, 13 millers, 21 miners, 25 house painters, 14 printers, 15 railroad employees, 8 saw-mill workmen, 9 shoemakers, 11 stone-cutters, 4 stationary engineers, 22 teamsters, and 16 others of various occupations involving hazard or exposure.

The average age at insurance is 35.97 years. Consumption caused 20.16 per cent. of the deaths, a rate considerably above the average, though perhaps hardly as high as might have been expected. The percentage of deaths from accident is 17.83, almost three times the rate for all classes taken together. Apoplexy, diseases of the heart, pneumonia, and diseases of the kidney give a very low percentage. Grouping the bakers, barbers, foundrymen, lumbermen, millers, printers, and stone-cutters together, we find that consumption caused 36.71 per cent. of the deaths, ranging from 23.08 per cent. among the bakers to 72.73 per cent. among the stone-cutters. On the other hand, the occupations of laborers, lumbermen, mariners, miners, railroad employees, saw-mill workmen, and stationary engineers give a percentage of death from accident

of 33.01 per cent., ranging from 16.67 per cent. among laborers to 75.00 per cent. among saw-mill workmen.

Class III., in addition to 181 clerks and bookkeepers, includes 4 telegraph operators and 2 bookbinders. The average age at insurance is only 32.17 years, and, occupation apart, we should look for a large death-rate from those diseases which we have found to be most prevalent in youth. Typhoid fever and other zymotic diseases, however, give a percentage but little above the general average, and deaths from accident are comparatively few in number.

These low relative proportions are partly due to the extremely high percentage (32.09 per cent.) attained by consumption, which thus caused almost one-third of the total mortality in this class. Pneumonia is credited with a percentage much above the average, but this is offset by a very low rate of death from other diseases of the respiratory system.

Class IV. comprises 25 blacksmiths, 22 builders, 55 carpenters, 32 machinists, 15 metal workers, and 34 other mechanics. The average age at insurance is 38.56 years. Typhoid fever caused 7.11 per cent. of the deaths, a rate larger than is found in any other class. Other zymotic diseases, consumption, diseases of the respiratory system (omitting pneumonia), diseases of the digestive system (other than those of the liver), and accidents all give a percentage above the average.

Class V. is made up of 20 butchers, 35 druggists, 33 grocers, 11 jewelers, 10 saddlers, 21 tailors, 9 tobacconists, and 19 other shopkeepers. The average age at insurance is 37.58 years. Typhoid fever, consumption, disease of the heart, diseases of the digestive system (except those of the liver), and diseases of the kidneys caused a high mortality in this class. The percentages for apoplexy and accidents are extremely small.

Class VI. is composed of 157 farmers and stock-raisers. The average age at insurance is 45.27 years. In spite of this advanced age, the death-rate from typhoid fever and other zymotic diseases and accidents is considerably above the average. Consumption caused only 10.19 per cent. of the deaths, but pneumonia and

other *acute* diseases of the respiratory system give a percentage of 22.29.

Class VII. includes 49 hotel-keepers, 42 saloon-keepers, 9 brewers, and 10 wholesale liquor merchants. All these individuals, simply from the nature of their occupation, were constantly exposed to the temptation of over-indulgence in alcoholic liquors. The average age at insurance was 39.55 years. The mortality from zymotic diseases, consumption, and heart disease, is relatively very low. The high rate (20.00 per cent.) for diseases of the nervous system is not without significance. The most striking evidence, however, of the influence of occupation is furnished by the percentage for diseases of the liver, namely, 17.27 per cent., almost four times the general average (4.40 per cent.) for all classes. These figures are in accord with the generally accepted opinion that degeneration of the liver is a frequent result of the habitual use of strong drink. Only 40 of the members of this class were native-born, the remaining 70 being of foreign birth ; 53 of the 70 were natives of Germany.

Class VIII. consists of 38 brokers, 37 insurance agents, 21 general agents, and 8 contractors. The average age at insurance is 43.70 years. Deaths from apoplexy reach the enormous percentage of 22.12, about double the general average for all occupations. Cancer and suicides show a very high rate, while consumption, pneumonia, diseases of the digestive system, and accidents are all below the average.

Classes IX., X., XI., and XII. are so small that but little weight can be given to the relative percentage of death from the various diseases. The age at insurance of Class IX. is 39.35 years ; of Class X., 36.59 years ; of Class XI., 39.74 years ; and of Class XII., 35.70 years. Class XII. is composed of 27 teachers, 12 civil engineers and surveyors, 7 editors, 10 dentists, 2 architects, 1 student, and 1 electrician.

TABLE X.—OCCUPATIONS. DURATION OF INSURANCE.

DISEASES CLASSIFIED. DURATION OF INSURANCE BEFORE DEATH IN EACH CLASS OF DISEASE, ARRANGED ACCORDING TO OCCUPATION.

Occupations. Duration of Policy.	Total	Typhoid and Typhus Fevers.	Other Zymotic Diseases.	Cancer.	Consumption.	Other Constitutional Diseases.	Apoplexy, Paralysis, etc.	Other Diseases of Nervous System.	Diseases of Heart and Other Diseases of Circulatory System.	Pneumonia.	Other Diseases of Respiratory System.	Diseases of Liver.	Other Diseases of Digestive System.	Diseases of Kidneys and Other Diseases of Urinary System.	Accidents and Injuries.	Suicides.	Unclassified.
	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.
Total	8.54	6.25	7.79	9.56	7.39	10.46	9.66	8.40	10.86	8.58	8.59	9.62	7.97	10.36	6.61	7.66	6.61
Merchants	9.42	8.37	9.32	12.78	7.88	10.96	9.93	9.05	10.72	9.08	8.56	10.65	9.00	10.90	6.10	9.28	5.75
Hazardous and unhealthy	7.62	6.67	8.20	7.50	6.85	10.33	8.05	8.50	9.31	7.00	8.22	11.00	8.54	8.18	6.35	5.20	9.67
Clerks	7.48	7.00	5.19	12.50	6.17	5.60	11.09	9.20	10.54	8.52	9.33	11.00	5.43	9.91	5.11	5.60	
Mechanics	8.11	3.92	10.06	9.00	7.91	9.00	11.85	8.50	9.80	6.44	8.77	8.83	6.81	6.70	8.87	6.60	
Shopkeepers	8.72	6.67	6.54	3.60	8.55	12.00	9.00	6.43	13.16	9.00	9.50	12.00	4.36	12.14	6.75	8.33	6.67
Farmers	8.57	8.56	5.21	9.00	7.37	10.25	9.75	5.00	8.83	8.61	9.92	12.00	7.60	12.11	7.85	10.00	
Hotel-keepers	8.30	1.50	4.00	13.00	7.69	9.67	8.21	6.75	13.60	8.00	7.67	9.47	12.60	10.67	5.29	4.00	
Brokers	7.27	6.80	7.67	7.71	7.38	19.00	7.87	8.25	9.62	10.33	4.71	3.33	6.00	8.43	2.67	5.20	1.00
Physicians	9.71	5.00	6.75	12.50	8.20	9.67	11.80	9.75	16.67	10.71	3.50	8.00	11.00	11.67	16.00	5.00	
Lawyers	9.29	3.00	10.25	8.00	8.70	10.50	11.60	10.67	12.00	9.50	12.50	4.50	8.50	10.67	5.33	15.00	
Clergymen	8.33	2.67	8.29	10.50	5.10	10.50	13.50	10.00	13.50	9.29	9.00	6.75	4.50	16.67	3.50		
Other Professions	8.28	3.00	7.11	10.50	7.36	17.00	9.67	9.00	9.00	8.60	8.50		10.25	6.00	1.00	16.00	12.00
	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.	years.

TABLE X.

Ranking the various occupations simply according to the length of duration of policy, this table would place them in the following order: Physicians, merchants, lawyers, shopkeepers, farmers, clergymen, hotel-keepers, other professions, mechanics, hazardous and unhealthy, clerks, and brokers. The variation in longevity appears surprisingly slight, ranging from 9.71 years down to 7.27 years. But when the average age at insurance of each class is considered, and the percentage of expectation of life attained by each class is calculated, the variation becomes much greater, and the classes rank as follows:

CLASSES RANKED ACCORDING TO PERCENTAGE OF EXPECTATION OF LIFE ATTAINED BY EACH CLASS.

Merchants	35.56 %
Farmers	35.21 %
Physicians	33.89 %
Lawyers	30.31 %
Clergymen	29.36 %
Shopkeepers	29.13 %
Hotel-keepers	29.12 %
Brokers	28.52 %
Mechanics	27.75 %
Other professions	26.47 %
Hazardous and unhealthy	24.51 %
Clerks	22.13 %
Total (2,000)	29.86 %

By this more equitable method of rating the occupations, farmers are raised from the fifth to the second place, closely following merchants, and brokers from the twelfth to the eighth place.

Clergymen do not rank as high as might be expected. On the other hand, hotel-keepers show a very fair percentage, in spite of the risks incident to their occupation. In this class of lives the importance of carefully weighing the moral hazard in each individual case can hardly be over-estimated.

The class of hazardous and unhealthy occupations naturally comes very low in the list, but the class of clerks shows a still more unfavorable record. The death of almost one-third of the latter class from consumption has undoubtedly much to do with the short average duration of insurance for the class.

In conclusion, it would seem that, while the occupation has a great influence in determining the longevity of policy-holders, that influence, when *a priori* unfavorable, may be much diminished by careful selection and consideration of the moral hazard.

PART II.

CONSUMPTION.

CANCER.

DISEASES OF THE NERVOUS AND CIRCULATORY SYSTEMS.

CONSUMPTION.

We have considered in this chapter the effect of hereditary and acquired tendencies in increasing the mortality from consumption. The relations of height and weight are also briefly discussed.

In life insurance, "hereditary" tendencies are usually sought for in the family history of the individual applying for insurance, whereas those tendencies are called "acquired" which appear in the personal history or physical condition of the individual himself.

This division is not strictly correct, as many of the symptoms found in the personal record of the individual should be properly regarded as evidence of a predisposition inherited from the parents. Spitting of blood, for instance, or disease of the spine, hip, or cervical glands, is probably in the large majority of cases due to an hereditary consumptive taint. For the sake of uniformity, however, we shall employ the terms ordinarily used, as they are brief and convenient, and with the above qualifications, are sufficiently accurate for our purpose.

TABLE A.

Tendencies to Consumption.	Hereditary Tendency.	Acquired Tendency.	Hereditary and Acquired Tendency.	No Tendency whatever.
Total . 2,000	252	152	44	1,552
Percentage . . .	12.60	7.60	2.20	77.60

Of the 2,000 cases, 252, or 12.6 per cent., showed a tendency to consumption in their family history, 152, or 7.6 per cent., in their personal history, 44, or 2.2 per cent., in both family and personal histories, leaving 1,552, or 77.6 per cent., without any consumptive taint whatever.

In the following table (B), the cases are classified as in the above

table (A), with the number and percentage of each class dying of consumption :

TABLE B.

TENDENCIES TO CONSUMPTION.	Total.	Deaths by Consumption.	
Total	2,000	353	
General Average Percentage ·		**17.65**	
Class I. Hereditary tendency alone	252	59	
Percentage · . . .		23.41	
Class II. Acquired tendency alone .	152	47	
Percentage · . . .		30.92	448 : 127.
Class III. Hereditary and acquired tendencies combined . .	44	21	28.35 %.
Percentage · . . .		47.73	
Class IV. No consumptive tendency whatever	1,552	226	
Percentage · . . .		14.56	

According to Table B, a consumptive taint appearing in the family record is of less significance than when it occurs in the personal history of the individual. Of the 252 cases with hereditary tendencies, about one in four, or exactly 23.41 per cent., died of consumption, while of the 152 cases with acquired tendencies, about one in three, or exactly 30.92 per cent., died of this disease. Of the 44 cases with both hereditary and acquired tendencies, 47.73 per cent., almost one-half, died of consumption. The mortality falls to 14.56 per cent., about one in seven, among those with neither inherited nor acquired taint. Grouping the three classes with consumptive tendencies together, their proportionate mortality from consumption is about double that of the class with no consumptive tendency whatever.

We have now to study separately each of the above classes of consumptive tendencies. The 44 cases in Class III. will require

two-fold consideration. They will therefore be included first with the 252 cases of Class I., and later with the 152 cases of Class II.

HEREDITARY TENDENCIES.

In the subjoined table, we have divided the 2,000 cases simply according to the presence or absence of an hereditary consumptive tendency, with the number and percentage of each class dying of consumption :

TABLE C.

Hereditary Tendencies to Consumption.	Total.	Consumption.
Total	2,000	353
General average percentage . . .		17.65
Hereditary consumptive taint	296	80
Percentage		27.03
No hereditary consumptive taint	1,704	273
Percentage		16.02

Two hundred and ninety-six of the two thousand cases showed an hereditary consumptive taint *at the time of insurance.* According to Table C, given above, 27.03 per cent. of these 296 cases died of consumption, while of the remaining 1,704, only 16.02 per cent. died of this disease. Probably many of these latter cases, if their family record could be completed up to the date of their death, would also reveal an inherited predisposition to consumption. This applies especially to those insuring at an early age, their family histories being but partially developed, so to speak, at the time of issue of the policy. And it is the younger lives, as we have seen (Tables II. and III., Part I.), that furnish the majority of the deaths from consumption. A clear family record, if the applicant is very young, is only of negative value in estimating a doubtful case, unless an accurate statement as to the grandparents can be obtained.

It has been suggested by Dr. A. H. Buck * that the terms "childbirth," "change of life," "exposure," "grief," "fever," and "general debility," so often used by the applicant to designate the cause of death of some member of the family, are often synonymous with consumption. He believes that one-half of these cases would prove, if the truth were known, to have been genuine cases of consumption. In his analysis of 268 deaths by consumption in the mortality experience of the United States Life Insurance Company, he found that in 29 per cent. there was a consumptive taint in the family, and that in an additional 24 per cent. there was a doubtful family record. He therefore concludes that, "in about 40 per cent. of our consumptive losses, the taint in the family history played an important part in determining the eventual cause of death." Had his investigations on this point been extended to the deaths by diseases other than consumption, he would probably have found among them an equally large percentage of doubtful family records, judging from the experience of this company. On searching the applications of the 1,704 cases given in Table C as without hereditary consumptive taint, it appears that 694 gave a family record which could be called doubtful. But only 111, or 15.99 per cent., of these 694 cases terminated in death by consumption, a percentage not varying materially from the 16.02 per cent. for the whole 1,704 cases. It would hardly be safe, then, to infer an inherited predisposition to consumption in an applicant because of one or more doubtful causes of death in his family history. The vagueness of the terms leaves the record incomplete and unsatisfactory, but beyond this should not weigh against the risk in question.

Returning to the 296 cases with undoubted record of consumption in the family history, we have classified them according to the degree of hereditary taint, with the numbers and percentage of each class dying of the disease in question.

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* "Medical Investigations in Life Insurance," published by the United States Life Insurance Company.

TABLE D.

Degree of Consumptive Taint in Family History.	Total.	Deaths by Consumption.	
Total . . .	296	80	
General Average Percentage . .		**27.03**	
Mother and father . .	3	2	
Percentage . .		**66.67**	
One parent and one or more brothers or sisters .	25	11	
Percentage . .		**44.00**	
Mother alone . . .	68	25	Group I. 37.98 %.
Percentage . .		**36.76**	
Father alone . . .	33	11	
Percentage . .		**33.33**	
One brother or sister .	138	25	
Percentage . .		**18.12**	
Two or more brothers or sisters . . .	29	6	Group II. 18.56 %.
Percentage . .		**20.69**	

The most striking fact brought out by the above table is the difference in the relative mortality from consumption, in proportion as the hereditary taint appears in the parents or in the brothers and sisters, the percentage being over twice as large in the former case as in the latter. Even two or more deaths by consumption among the brothers and sisters appear to exert much less influence than the death of one parent. The percentage of 18.56 in Group II., indeed, is but slightly larger than the percentage of 16.02 in the 1,704 cases without inherited taint (*v.* Table C).

If we classify the 296 cases simply according to the *number* of deaths by consumption in the family history, we get the following table :

TABLE E.

Number of Deaths by Consumption in Family History.	Total.	Deaths by Consumption.
Total	296	80
General average percentage . . .		27.03
One member of family	239	61
Percentage.		25.25
Two or more members of family . . .	57	19
Percentage.		33.33

A difference of less than 8 per cent. in the proportion of deaths by consumption in the two classes in Table E corroborates what has been suggested in the comments on Table D, namely, that the number of individuals dying of consumption in the family of the applicant is of less importance than the degree of their relationship to him.

In 44 of the 296 cases the hereditary taint was reinforced by a more or less marked acquired predisposition to consumption. In the following table the effect of this reinforcement in increasing the mortality is seen very clearly:

TABLE F.

Hereditary Tendencies to Consumption.	Total.	Died of Consumption.	Hereditary Taint Alone.	Died of Consumption.	Acquired Tendencies Combined with Hereditary Taint.	Died of Consumption.
Total . . .	296	80	252	59	44	21
General average percentage		27.03		23.41		47.73
Group I. Hereditary taint in parents	129	49	107	36	22	13
Percentage . . .		37.98		33.64		59.09
Group II. Hereditary taint in brothers or sisters . .	167	31	145	23	22	8
Percentage . . .		18.56		15.86		36.36

The numbers are not sufficiently large to allow of their being divided into the six classes of Table D, so we have consolidated them into the two main groups, as given in that table.

Of the 252 cases not complicated by the acquired tendency, only 59, or 23.41 per cent., died of consumption. This percentage is raised to 47.73 per cent., or slightly more than doubled, by the addition of the personal predisposition. The effect is more marked in Group II. than in Group I., the percentage of 15.86 being much more than doubled. This is probably due to the fact that the acquired tendency represents a more positive element added to the rather uncertain hereditary taint when found only in the brothers or sisters.

ACQUIRED TENDENCIES.

Under this heading we have included the 196 cases, whose personal history, or physical condition, as recorded in their applications, suggests an acquired predisposition to consumption.

TABLE G.

ACQUIRED TENDENCIES TO CONSUMPTION.	Total.	Died of Consumption.
Total	2,000	353
General average percentage . . .		17.65
Acquired tendency to consumption . . .	196	68
Percentage		34.69
No acquired tendency to consumption . .	1,804	285
Percentage		15.80

As seen in the above table, 34.69 per cent. of the 196 cases died of consumption, the percentage for the remaining 1,804 being but 15.80.

It has already been noted that 44 of these 196 cases also showed an inherited consumptive taint, leaving 152 with a clear family record.

In Table H, the cases are classified according to the symptoms recorded in the applications, and also according to the presence or absence of hereditary taint.

TABLE H.

ACQUIRED TENDENCIES TO CONSUMPTION.	Total.	Died of Consumption.	ACQUIRED TAINT ALONE.		HEREDITARY AND ACQUIRED TAINTS COMBINED.	
			Total.	Died of Consumption.	Total.	Died of Consumption.
Total	196	68	152	47	44	21
General average percentage		34.69		30.92		47.73
Spitting of blood, previous to insurance . . .	35	15	26	9	9	6
Percentage . . .		42.86		34.62		66.67
Bronchitis, pneumonia or pleurisy, previous to insurance .	102	26	80	20	22	6
Percentage . . .		25.49		25.00		27.27
Disease of hip, spine, or cervical glands in childhood .	8	3	8	3	..	....
Percentage . . .		37.50		37.50		
Subject to asthma at time of insurance . . .	25	7	20	4	5	3
Percentage . . .		28.00		20.00		60.00
Subject to cough at time of insurance	15	10	11	6	4	4
Percentage . . .		66.67		54.55		100.00
Subject to catarrh at time of insurance . . .	5	3	2	1	3	2
Percentage . . .		60.00		50.00		66.67
Traces of former disease in lungs	6	4	5	4	1	....
Percentage . . .		66.67		80.00		

Consumption caused a mortality of 30.92 per cent. among the

152 cases not complicated by a hereditary consumptive taint, as compared with 47.73 per cent. among the 44 cases combining both inherited and acquired tendencies. As the various classes grouped together in Table H differ considerably in their relative importance, it may be well to consider briefly each class by itself.

SPITTING OF BLOOD.

Thirty-five cases had had spitting of blood previous to insurance, of whom 15, or 42.86 per cent., died of consumption. Even among the 26 cases showing no inherited taint, 9, or 34.62 per cent., died of consumption, while the percentage of death from this disease rises to 66.67 among those with hereditary predisposition.

The interval between the spitting of blood and the time of insurance varied in the different cases from one to thirty years, as shown in the following table :

TABLE J.

INTERVALS SINCE SPITTING OF BLOOD.	Total.	Died of Consumption.	
Total	35	15	
General average percentage		42.86	
One year	2	2	
Percentage		100.00	
Two years	1	1	
Percentage		100.00	
Three to five years	10	5	60.00 %.
Percentage		50.00	
Six to ten years	7	4	
Percentage		57.14	
Eleven to twenty years	10	2	
Percentage		20.00	20.00 %.
Twenty-one to thirty years	5	1	
Percentage		20.00	

According to Table J, the significance to be attached to the spitting of blood depends mainly upon the length of time that has elapsed since its occurrence. Of the 20 cases in which the interval was less than ten years, 12, or 60.00 per cent., died of consumption, while of the 15 cases in which the interval was over ten years, only 3, or 20.00 per cent., died of this disease.

BRONCHITIS, PNEUMONIA, OR PLEURISY PREVIOUS TO INSURANCE.

Of the 102 cases in this class, 26, or 25.49 per cent., died of consumption, the percentage being but little higher among those showing hereditary taint. It may be added that there were 24 deaths by pneumonia or other acute respiratory disease, or 23.53 per cent. (The percentage of death from these diseases among the whole 2,000 cases was but 14.25.)

It is thus seen that almost one-half, or exactly 49.02 per cent., of the deaths in this class were caused by acute or chronic disease of the respiratory organs.

DISEASE OF HIP, SPINE, OR CERVICAL GLANDS IN CHILDHOOD.

There are but 8 cases in this group, of which 3, or 37.50 per cent., died of consumption. This percentage would probably have been larger had any of the cases shown in addition a tubercular taint in their family history.

SUBJECT TO ASTHMA.

There were 7 deaths from consumption in this class, or 28.00 per cent. of the whole number. This percentage falls to 20.00 in the non-hereditary group, and rises to 60.00 in the group showing an inherited consumptive taint. This great variation is probably due to the varying significance of the symptom, according as it does or does not cover something more serious than simple asthma.

SUBJECT TO COUGH.

Ten deaths, or two-thirds of the whole number, in this class were due to consumption. Two more deaths were caused by acute

respiratory disease, leaving but three deaths from diseases other than those of the respiratory system.

SUBJECT TO CATARRH.

What has been said above as to the significance of asthma may be applied with equal truth to catarrh. Had we simply to do with cases of naso-pharyngeal catarrh, we should hardly consider it necessary to include them among those showing acquired tendencies to consumption. As three of the five cases died of consumption, it is probable that, in those three cases at least, the words "subject to catarrh" did not fairly express the physical condition of the applicant.

TRACES OF FORMER DISEASES IN LUNGS.

In this, as in the preceding class, the number of cases is very small, but the heavy mortality from consumption still holds good, 4 of the 6 cases dying of this disease. The two remaining cases both died of typhoid fever.

THE RELATIONS OF HEIGHT AND WEIGHT AND THEIR INFLUENCE UPON THE MORTALITY FROM CONSUMPTION.

The height and weight at the time of insurance of each one of the 2,000 cases was found recorded in the applications. We were thus enabled to obtain the following table of averages:

TABLE K.

Average Height and Weight.	Total.	Died of Consumption.	Died of other Causes.
Total . . .	2,000	353	1,647
Average height . . .	5 ft. 8.2 in.	5 ft. 8.2 in.	5 ft. 8.2 in.
Average weight . . .	156.2 lbs.	143.7 lbs.	158.9 lbs.

As seen above, the average weight of the total 2,000 cases was 156.2 pounds, whereas the average weight for the 353 consumptives was only 143.7 pounds, the height being the same in both cases. Leaving out the consumptives, the average weight of the 1,647 dying of other causes was 158.9 pounds.

As averages are not always trustworthy, we have constructed Table L, below, in which the correspondence between height and weight is estimated for each case separately. This table also shows the effect of even a moderate variation from the standard weight in diminishing or increasing the mortality from consumption. The first group includes those whose weight exceeded the American standard for their height by more than five pounds, the second those whose weight ranged from five pounds above to five pounds below the standard, the third those whose weight was more than five pounds under the standard.

TABLE L.

	Total.	Died of Consumption.		Group I. Weight above Standard. Died of Consumption.		Group II. Standard Weight. Died of Consumption.		Group III. Weight below Standard. Died of Consumption.
Total . .	2,000	. 353	750	41	560	100	690	212
Percentage · ·		17.65		5.47		17.86		30.72

According to Table L, weight is a most important factor in regulating the percentage of death from consumption. The normal mortality of 17.65 per cent. falls to 5.47 per cent. among those above the standard weight, resumes its ordinary figures in Group II., and rises to 30.72 per cent. among those below the standard in weight.

The figures are even more striking in Table M, in which the 2,000 cases are classified according to the presence or absence of a predisposition to consumption.

TABLE M.

	Total.	Died of Consumption.	Group I. Weight above Standard.		Group II. Standard Weight.		Group III. Weight below Standard.	
				Died of Consumption.		Died of Consumption.		Died of Consumption.
Total . .	2,000	353	750	41	560	100	690	212
General average percentage .		17.65		5.47		17.86		30.72
Class A. Predisposition to consumption, hereditary or acquired, or both .	448	127	163	10	99	27	186	90
Percentage . .		28.35		6.13		27.27		48.39
Class B. No predisposition to consumption . . .	1,552	226	587	31	461	73	504	122
Percentage . .		14.56		5.28		15.84		24.21

The effect of a slight excess of weight in almost annulling a consumptive tendency is shown by the practical agreement of the percentages in the two classes in Group I. In Group II., in which there is neither excess nor deficiency of weight, the percentages do not vary materially from the general average of their respective classes. On the other hand, in Group III., the union of light weight and a predisposition to consumption gives a mortality of 48.39 per cent., and even among those with no such predisposition, the percentage is 24.21.

CANCER.

Although cancer is usually classed among hereditary diseases, there is a wide difference of opinion among authorities as to the exact part played by the hereditary taint in the causation of the disease. Velpeau believed that one in three cases of cancer showed an inherited predisposition. Sir James Paget's investigations yielded one in four; Mr. Sibley concluded from the statistics of Middlesex Hospital that the proportion was less than one in twelve. The late Willard Parker found a record of cancer in the family of only 56 out of 397 cases of cancer of the breast operated upon by him. He expresses it as his well-considered opinion that cancer is not an hereditary disease.

The result of our investigations on this point is given in Table A, below.

TABLE A.

	Total.	Died of Cancer.
Hereditary tendencies to cancer . .	2,000	68
General average percentage .		**3.40**
Class I. Cancer in family history . .	56	1
Percentage		**1.79**
Class II. No cancer in family history .	1,944	67
Percentage		**3.45**

Of the 56 cases in Class I., 17 lost a father, 24 a mother, 7 a brother, and 8 a sister by cancer. The hereditary tendency in all these cases is thus seen to be marked, and yet but one of the 56 terminated in death by cancer, the percentage being actually less than among the 1,944 cases whose family history, up to the time of insurance, was free from any cancerous taint. This accidental variation of percentage would no doubt disappear were the number

of cases sufficiently large to give uniform results. As far as these figures go, they support the opinion that has been gaining ground of late among medical men, namely, that the hereditary element is not such an important factor in the production of cancer as was formerly believed.

The average age at insurance of the 56 cases was 43.00 years, the average age at death 52.62 years, giving a duration of policy of 9.62 years. As the average duration of policy of the 2,000 cases was but 8.54 years (*vide* Table IV., Part I.), the cancerous tendency in the family history cannot be said to have lessened the longevity of the 56 cases.

Regarded from the standpoint of life insurance, then, a death from cancer in the family record of an applicant does not necessarily prejudice the risk in any respect.

DISEASES OF THE NERVOUS AND CIRCULATORY SYSTEMS.

Diseases of the nervous and circulatory systems have so many features and symptoms in common that it has seemed well to group the two classes in one chapter. Though these diseases are not usually considered hereditary, nevertheless we sometimes find a constitutional tendency to them transmitted from one generation to another.

Diseases of the urinary system are also closely allied with the above diseases, and an attempt was made to include them in this study. It was, however, finally decided to omit them for the present, for the sake of greater clearness.

The various tendencies are divided into "hereditary" and "acquired," as in the chapter on consumption. We have followed the same plan as in that chapter, and arranged a similar series of tables.

TABLE A.

TENDENCIES TO DISEASES OF NERVOUS AND CIRCULATORY SYSTEMS.	Hereditary Tendency.	Acquired Tendency.	Hereditary and Acquired Tendencies.	No Tendency Whatever.
Total . 2,000	183	144	36	1,637
Percentage . . .	9.15	7.20	1.80	81.85

As seen in Table A, 183 cases, or 9.15 per cent., showed an hereditary tendency alone; 144, or 7.20 per cent., an acquired tendency alone; and 36, or 1.80 per cent., both hereditary and acquired tendencies; the remaining 1,637 cases, or 81.85 per cent., were free from any tendency whatever, either in the family record or personal history.

In the subjoined table (B), we see the apparent effect of these

tendencies in increasing the mortality from the diseases under
consideration, the cases being classified as in Table A, with the num-
bers and percentages dying in each class.

TABLE B.

Tendencies to Diseases of Nervous and Circulatory Systems.	Total.	Deaths by Diseases of		Total Deaths by Diseases of Nervous and Circulatory Systems.
		Nervous System.	Circulatory System.	
Total . . .	2,000	308	153	461
General average percentage		15.40	7.65	23.05
Class I. Hereditary tendency alone	183	37	21	58
Percentage . . .		20.22	11.48	31.70
Class II. Acquired tendency alone	144	30	15	45
Percentage . . .		20.83	10.42	31.25
Class III. Hereditary and acquired tendencies combined	36	8	8	16
Percentage . . .		22.22	22.22	44.44
Class IV. No tendency whatever	1,637	233	109	342
Percentage . . .		14.23	6.66	20.89

According to Table B, the total relative mortality from diseases
of the nervous and circulatory systems is about the same, whether
the tendency be hereditary or acquired.   The percentage rises to
44.44 among those with hereditary and acquired tendencies com-
bined, and falls to 20.89 among the 1,637 cases with no tendency
whatever.

HEREDITARY TENDENCIES.

In Table C, the 2,000 cases are divided according to the
presence or absence of the hereditary tendency.   The 219 cases
comprise Classes I. and III. of Table B.

TABLE C.

HEREDITARY TENDENCIES TO DISEASES OF NERVOUS AND CIRCULATORY SYSTEMS.	Total.	DEATHS BY DISEASES OF		Total Deaths by Diseases of Nervous and Circulatory Systems.
		Nervous System.	Circulatory System.	
Total . . .	2,000	308	153	461
General average percentage		15.40	7.65	23.05
Hereditary tendency . .	219	45	29	74
Percentage · · ·		20.55	13.24	33.79
No hereditary tendency . .	1,781	263	124	387
Percentage · · ·		14.77	6.96	21.73

Table C does not call for special comment.

In order to study more closely the 219 cases with hereditary tendencies, we have subdivided them according to the nature of those tendencies with the proportionate mortality of each class from diseases of the nervous and circulatory systems respectively.

TABLE D.

HEREDITARY TENDENCIES TO DISEASES OF NERVOUS AND CIRCULATORY SYSTEMS.	Total.	DEATHS BY DISEASES OF		Total Deaths by Diseases of Nervous and Circulatory Systems.
		Nervous System.	Circulatory System.	
Total . . .	219	45	29	74
General average percentage		20.55	13.24	33.79
Class I. To diseases of nervous system	154	34	18	52
Percentage · · ·		22.08	11.69	33.77
Class II. To diseases of circulatory system . . .	65	11	11	22
Percentage · · ·		16.92	16.92	33.84

In Class I. of the above table, the family record suggested a greater or less tendency to diseases of the nervous system. That this tendency was real in many cases is shown by the large percentage of deaths from these diseases, viz., 22.08 per cent., the normal percentage being only 15.40 (*vide* Tables B and C). Diseases of the circulatory system also caused a high mortality in this class, namely, 11.69 per cent. As the tendencies of the 154 cases in Class I. vary greatly in their significance, we have arranged them as follows :

TABLE Dᴵ.

Nature of Supposed Tendency in Family History to Diseases of Nervous System.	Total.	Deaths by Diseases of Nervous System.	
Total . . . . . General average percentage . . .	154	34 22.08	
One or more deaths from apoplexy . . . Percentage	118	21 17.80	
One death from insanity . . . . . Percentage	15	5 33.33	36.11 %.
One death from alcoholism . . . . Percentage	12	4 33.33	
One death from epilepsy . . . . Percentage	9	4 44.44	

The relative mortality among the 118 cases with apoplexy in the family history was only 17.80 per cent. On the other hand, of the 36 cases with a family history of insanity, alcoholism, or epilepsy, 13, or 36.11 per cent., died of diseases of the nervous system. It should be added that 3 of the 15 cases with hereditary tendency to insanity died by suicide.

The 65 cases in Class II. of Table D reported one or more deaths by heart disease in their family history. The mortality in this class from diseases of the circulatory system reaches the very high percentage of 16.92, more than double the normal percentage (7.65). We have now to consider the effect of adding an acquired tendency to the hereditary tendencies described above.

On dividing the 219 cases according to the presence or absence of an additional acquired predisposition, we get the following Table E:

TABLE E.

Hereditary Tendencies to Diseases of Nervous and Circulatory Systems.	Total.	Total Deaths by Diseases of Nervous and Circulatory Systems.	Hereditary Tendencies Alone.		Hereditary and Acquired Tendencies Combined.	
				Deaths by Diseases of Nervous and Circulatory Systems.		Deaths by Diseases of Nervous and Circulatory Systems.
Total . .	219	74	183	58	36	16
General average percentage		33.79		32.22		44.44
Class I. To diseases of nervous system .	154	52	125	39	29	13
Percentage .		33.77		31.20		44.83
Class II. To diseases of circulatory system .	65	22	58	19	7	3
Percentage .		33.84		32.76		42.86

According to this table the percentages of mortality are increased in about the same proportion in the two classes by the addition of an acquired to the hereditary tendency.

ACQUIRED TENDENCIES.

One hundred and eighty cases showed a more or less marked acquired tendency to diseases of the nervous and circulatory systems. These cases comprise Classes II. and III. of Table B. The 36 cases of Class III., in which were combined hereditary and acquired tendencies, have already been studied from the former standpoint. In the subjoined Table F, the mortality of the 180 cases may be compared with that of the 1,820 cases without any acquired predisposition.

TABLE F.

| ACQUIRED TENDENCIES TO DISEASES OF NERVOUS AND CIRCULATORY SYSTEMS. | Total. | DEATHS BY DISEASES OF | | Total Deaths by Diseases of Nervous and Circulatory Systems. |
		Nervous System.	Circulatory System.	
Total . . .	2,000	308	153	461
General average percentage		15.40	7.65	23.05
Acquired tendencies . .	180	38	23	61
Percentage . . .		21.11	12.78	33.89
No acquired tendencies . .	1,820	270	130	400
Percentage . . .		14.83	7.14	21.97

We have divided these 180 cases into three groups, as shown in Table G, with the relative mortality for each group.

TABLE G.

| ACQUIRED TENDENCIES TO DISEASES OF NERVOUS AND CIRCULATORY SYSTEMS. | Total. | DEATHS BY DISEASES OF | | Total Deaths by Diseases of Nervous and Circulatory Systems. |
		Nervous System.	Circulatory System.	
Total . . .	180	38	23	61
General average percentage		21.11	12.78	33.89
Group I. To Diseases of nervous system	18	8	. . . . .	8
Percentage . . .		44.44	. . . . .	44.44
Group II. To Diseases of circulatory system . . .	19	4	2	6
Percentage . . .		21.05	10.53 .	31.58
Group III. Rheumatism or gout previous to insurance .	143	26	21	47
Percentage . . .		18.18	14.69	32.87

Group I., in the above table, is made up as follows:

Previous history of										
Intemperance,	3 cases, of whom 1 died of disease of nervous system and								1 by suicide.
Partial paralysis,	3 "	"	2	"	"	"	"	"	0	"
Convulsions,	2 "	"	2	"	."	"	"	"	0	"
Nervous prostration, 3	"	"	0	"	"	"	"	"	1	"
Insanity,	2 "	"	2	"	"	"	"	"(insan'y) 0	"
Meningitis,	2 "	"	0	"	"	"	"	"	0	"
Epilepsy,	1 "	"	0	"	"	"	"	"	0	"
Very excitable and nervous at time of examination,	2 "	"	1	"	"	"	"	"	1	"
Total .	18 "	"	8	"	"	"	"	"	3	"

Diseases of the nervous system and suicides caused 11 deaths of the 18, or 61.11 per cent.

Group II. is composed of 16 cases with history of irregular pulse previous to or at the times of examination, 2 cases with doubtful heart murmur, and 1 case with slight cardiac hypertrophy. As seen in the table, only 2 of the 19 cases died of disease of the circulatory system, but 4 died of disease of the nervous system (apoplexy in each case).

Group III. includes 136 cases with history of rheumatism and 7 with history of gout. The percentage of death from diseases of the nervous system, while less than in the two previous groups, is still considerably above the average for the whole 2,000 cases. Diseases of the circulatory system caused a mortality of 14.69 per cent., about double the normal percentage.

RHEUMATISM.

It is very important to distinguish between the various kinds of rheumatism, but in the majority of the 136 cases above we are unable to do so with any accuracy. In 68 cases, or just one-half, the disease is simply referred to as "rheumatism." In the others it is variously described as "slight" (38 cases), "chronic" or

"occasional" (4 cases), and "acute articular" or "inflammatory" (26 cases). It is well understood that acute articular or inflammatory rheumatism is the form most apt to involve the heart, and yet of the 26 cases only 1, or 3.85 per cent., died of disease of the heart, while of the 38 "slight" cases, 10, or 26.32 per cent., died of heart disease. These percentages are directly the opposite of what we should *a priori* expect, especially the low mortality among the 26 cases, who, according to their own statement, had suffered from acute inflammatory rheumatism. The following seems to us a reasonable explanation of this apparent anomaly : The words "inflammatory rheumatism" in the 26 cases would naturally arrest the attention of the examiner and lead to a more thorough examination of the heart, with the result of excluding any case of heart disease already developed. The consequence of this careful selection would be to give us 26 individuals unusually free from cardiac weakness, hence the small mortality subsequently from heart disease. On the other hand, "slight rheumatism" is so common that its simple mention in the personal history of an applicant hardly attracts any notice, and yet many of these cases, if they were investigated, would probably prove to have been of the severe inflammatory type, with involvement of the heart.

[Among the risks rejected by this Company were 229, in which the cause of rejection was organic disease of the heart. Sixty-one of the 229, or 26.64 per cent., had had inflammatory rheumatism. On the other hand, there were only 10 cases, or 4.37 per cent. of the 229, in which the history was of "slight rheumatism." These figures are in full accord with the explanation suggested above.]

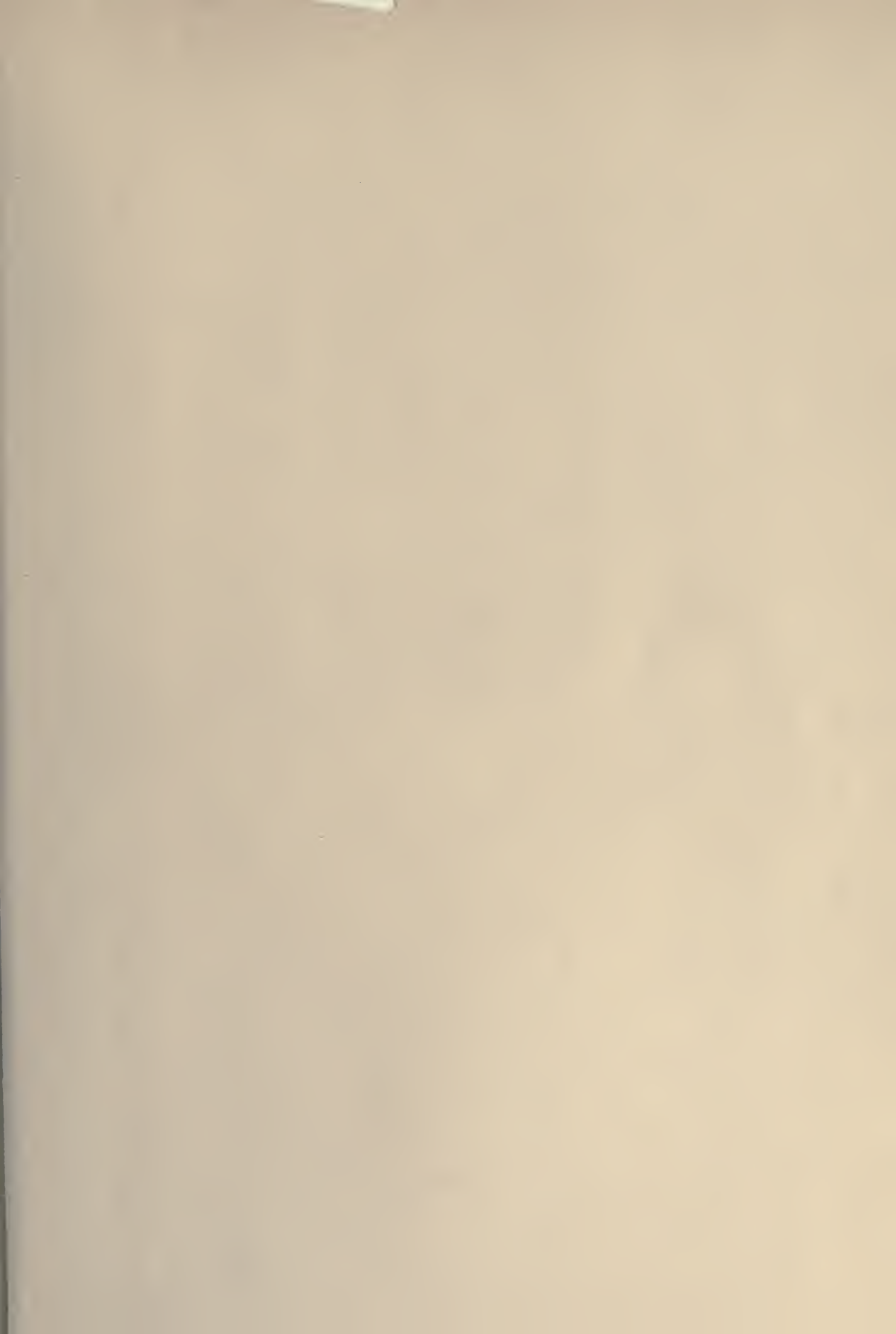Two of the 136 rheumatic cases died of rheumatism.

The mortality of the 7 gouty cases was distributed as follows : Gout 2 (hereditary taint also in both cases), apoplexy 1, heart disease 1 (father and sister died of rheumatism, brother of apoplexy), cirrhosis of liver 1, stricture of œsophagus 1, Bright's disease 1.
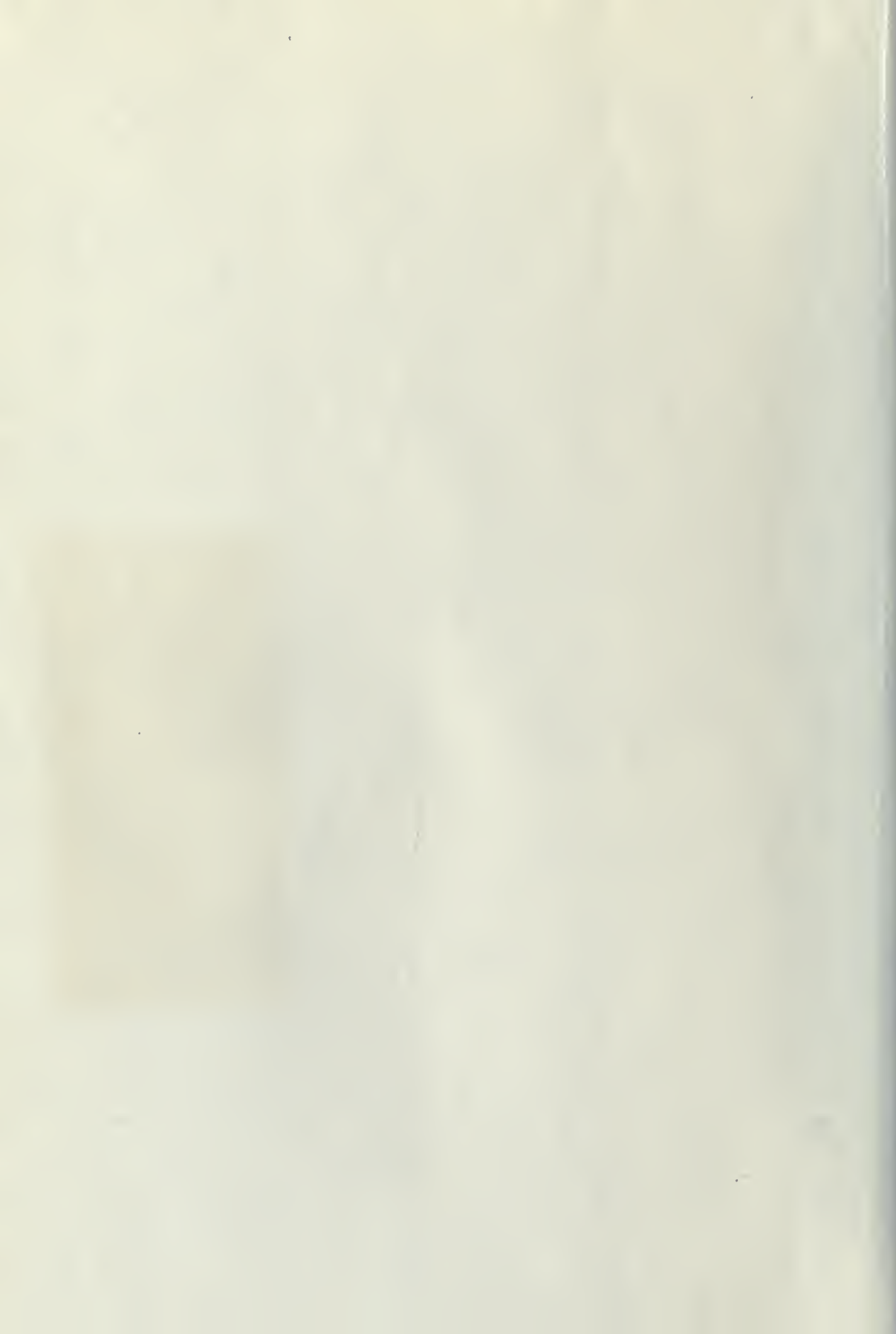
In order to show the effect of the presence or absence of an additional hereditary tendency, we have divided the 180 cases into two classes, as follows:

TABLE H.

ACQUIRED TENDENCIES TO DISEASE OF NERVOUS AND CIRCULATORY SYSTEMS.	Total.	Total deaths by Diseases of Nervous and Circulatory Systems.	ACQUIRED TENDENCIES ALONE.		ACQUIRED AND HEREDITARY TENDENCIES COMBINED.	
				Deaths by Disease of Nervous and Circulatory Systems.		Deaths by Disease of Nervous and Circulatory Systems.
Total . . .	180	61	144	45	36	16
General average percentage .		33.89		31.25		44.44
Class I. To diseases of nervous system .	18	8	13	7	5	1
Percentage . .		44.44		53.85		20.00
Class II. To diseases of circulatory system .	19	6	13	5	6	1
Percentage . .		31.58		38.46		16.67
Class III. Rheumatism or gout previous to insurance . . .	143	47	118	33	25	14
Percentage . .		32.87		27.97		56.00

In Classes I. and II. of Table H, the number of cases is too small when thus divided to give uniform results. In these classes, also, the acquired tendency is so much more important than the hereditary tendency that any variation may well be considered accidental. In Class III. the percentage is doubled by the addition of the hereditary tendency.

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